THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

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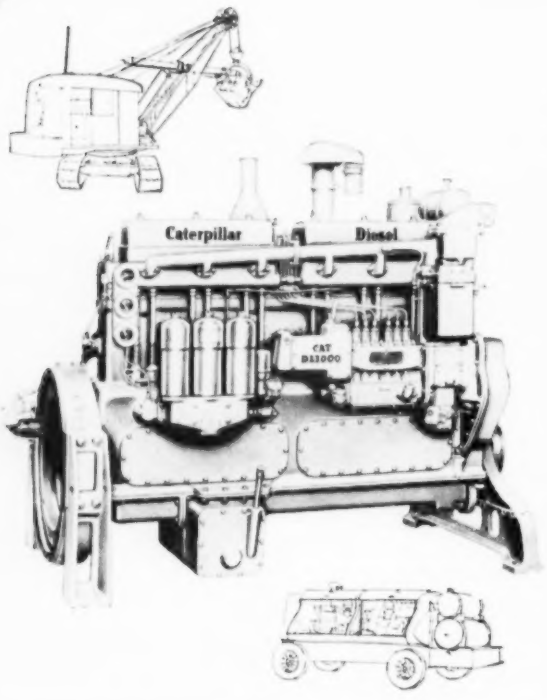
Long stockpiling conveyor has three belts, Columbus Rock Co., Columbus, Ga.



Announcing the

NEW 190-HP CAT* D13000 ENGINE

CATERPILLAR ADVANCED DESIGN FEATURES IN THE NEW D13000

While retaining such time-proved features as aluminum alloy main and connecting rod bearings, "Hi-Electro" hardened and Superfinished bearing surfaces, exclusive Caterpillar fuel injection system, ability to use low-cost No. 2 furnace oil without fouling, etc., the new D13000 incorporates many new features, among them:

NEW Valves, Inserts, Rotators—new components, standard in the breathing system, combine increased breathing ability with longer valve life—make possible additional horsepower output and lower maintenance costs.

NEW Vibration Damper—sturdy, metal-enclosed, fastened directly to front of crankshaft. Keeps unit vibration-free at higher speeds. Optional in installations where engine speed is kept below 1000 r.p.m.

NEW Camshaft—improved high lift cam profiles give smooth valve seating and increased breathing ability. This increased capacity, also made possible by new oil-bath air cleaner and larger intake and exhaust manifolds, insures low exhaust temperatures and adequate reserve power.

NEW Water Pump—larger, with a greatly increased capacity to answer cooling needs of this modern, high-powered diesel.

NEW Pistons—oil-cooled, made of high-strength, lightweight aluminum alloy with stainless-steel heat plugs in the high-temperature zone and cast-in iron bands for the top ring groove to give best service at lowest final cost.

NEW Oil Pump—features not just one, but two pressure controls to assure correct lubrication for all moving parts from the first turn of the crankshaft.

For complete details, specifications, attachments, etc., see your nearby Caterpillar Dealer

...yours for greater power, production, profits!

For years, working in all kinds of construction equipment, conditions and jobs, the Caterpillar D13000 Engine has proved itself a big money-maker for power users. Now, here's a new D13000, designed and built to bring you even greater power, production and profits!

In the new D13000, you get 21% more brake horsepower. Its governed speed, raised to 1200 r.p.m., provides greater versatility and productive capacity. While keeping outstanding, time-tested parts, it adds advanced design features to set new standards of stamina, dependability, economy and long life. And its wide variety of matched accessories and attachments makes it readily adaptable for any need.

For jobs requiring power in the 145 (continuous) to 190 (intermittent) horsepower range, your best buy is this rugged new Cat D13000 Engine. Leading manufacturers of excavators, crushers, compressors and other heavy-duty machinery can furnish it in their equipment. Get the *complete* facts about it today from your nearby Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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D13000—
A NEW STANDARD
OF DIESEL POWER

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

After two million tons, a new job for this cord belt

THAT'S just one section of the 3300-foot conveyor system on the Folsom Dam project. A series of belts, like a bucket brigade, deliver 550 tons of aggregate an hour from bunkers across a river to the cement batch plant you see in the background.

In choosing the belts, engineers knew the ordinary type could not handle the entire job because of the sharp 139-foot lift up to the screening tower. They needed a belt that was strong, yet flexible for the long, steep climb, so a B. F. Goodrich *cord* belt was selected.

This B. F. Goodrich belt is made of plies of parallel cords that run lengthwise. Each cord is completely surrounded by rubber—no cross threads tie them together. The parallel cords supply the extra strength, yet are flexible so that troughing is natural, belt keeps centered on idlers, spillage is held to a minimum.

And because of the cord belt's ability to withstand impacts, cutting, and heavy loads, the belt in the picture is expected to carry the 2,000,000 tons needed here, and then be moved to another construction site for many more years of useful service.

Your B. F. Goodrich distributor can tell and show you why BFG cord belts are able to give you this kind of service consistently (not just once in a while) in quarries, ore mines, and on construction jobs where severe operating conditions require the best and most modern conveyor belt construction for the most dependable, economical performance. *The B. F. Goodrich Company, Dept. M-320, Akron 18, Ohio.*

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ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY — LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

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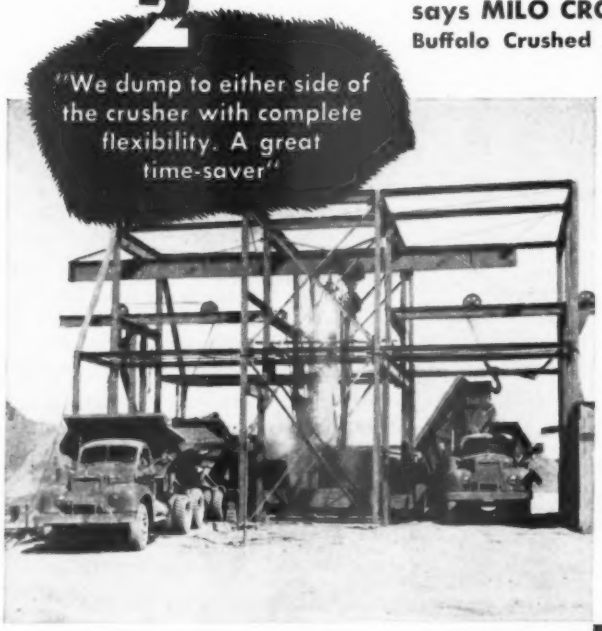
Change over to tandem hauling for increased capacity at low cost.

1

"Tandem hauling and two-way dumping are two profitable advantages of the Easton side-dump idea"

2



says **MILO CROUSE, Manager of Operations**
Buffalo Crushed Stone Corp., Bowmansville, N. Y.

"At comparatively small cost, our changeover from 12 Easton trailers to 6 Easton truck-and-trailer tandems gave us all the increased haulage capacity we needed. Our past experience with Easton side-dumps, through 5,000,000 tons of all-weather production, proved the dependability of Easton equipment. Easton tandems require practically no maintenance; they are on the job day after day, giving fast service to three shovels in two different quarries."

Easton engineers can show you the way to new economies with side-dump off-highway hauling. Write today to:

Easton Car & Construction Company • Easton, Pa.

Easton overhead dumping system provides remote stop-and-hold control. Easton two-way dumping permits the tandems to pull up to either side of the crusher at will. *Cab-controlled hydraulic dumping is also available with Easton side-dumps.*

B-1065

EASTON®
FIRST IN SIDE-DUMP ENGINEERING

Atkinson-Ostrander Construction Co. achieve best results with TIMKEN® carbide insert rock bits and TIMKEN Rock Bit Engineering Service

LOCATION: *The Dalles Dam, 95 miles up the Columbia River from Portland, Oregon.*
OPERATING CONDITIONS: *Lava basalt formation which varied from medium hard to extreme hardness.*

ON their first project at the Dalles Dam in Oregon, Atkinson-Ostrander Construction Company used Timken Rock Bit Engineering Service to determine the best bit for drilling a lava basalt formation varying from medium to extreme hardness. A Timken® carbide insert bit was selected which gave better results than any others tested.

Timken carbide insert bits give highest speed through hard and abrasive ground. They're most economical for constant-gage holes, small diameter holes, extremely deep holes.

However, they are *not* the best solution for *all* your drilling problems!

Timken multi-use bits are most economical for ordinary ground. With correct and controlled reconditioning, they'll give the lowest cost per foot of hole when full increments of steel can be drilled.

To be sure you're using the right bit type and design, call on the Timken Rock Bit Engineering Service. Twenty years of solving rock bit problems have given them the experience that will help you cut your drilling costs.

Timken carbide insert and multi-use bits are interchangeable in the same thread series. This means you can change bit types quickly, easily as the ground changes—right on the job!

Both Timken carbide insert and multi-use bits are made from electric furnace Timken fine alloy steel and have special shoulder unions which protect threads from drilling impact.

For help with your particular drilling problem, write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

Timken threaded multi-use rock bit

Timken threaded carbide insert rock bit

...your best bet for the best bit ...for <u>every</u> job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

● Here's a piece of equipment you can put almost anywhere a truck will go. You can covert it to a Shovel or Dragline without repositioning the base and it will serve in the pit or up on top when the pressure is on for extra output.

As a Crane it assures high output on stock piling—it speeds up plant maintenance and new construction. It is the answer to loading and unloading cars and trucks and it handles any equipment that a standard crawler crane will handle from a clamshell to pile driver leads.

The Northwest Truck Crane brings you a combination of advantages found in no other similar equipment. It combines all the Northwest Crane advantages, the "Feather-Touch" Clutch Control for easy operation, Uniform Pressure Swing Clutches, a choice of Boom Hoist Equipment, cast steel machinery bases and side frames and many other advantages with improvements in Truck design and construction that assure easier operation and greater versatility.

Let us send you complete details on this rig. There is a detailed catalog that will interest you. Write for it.

DON'T BUY A TRUCK CRANE without getting full details on NORTHWEST

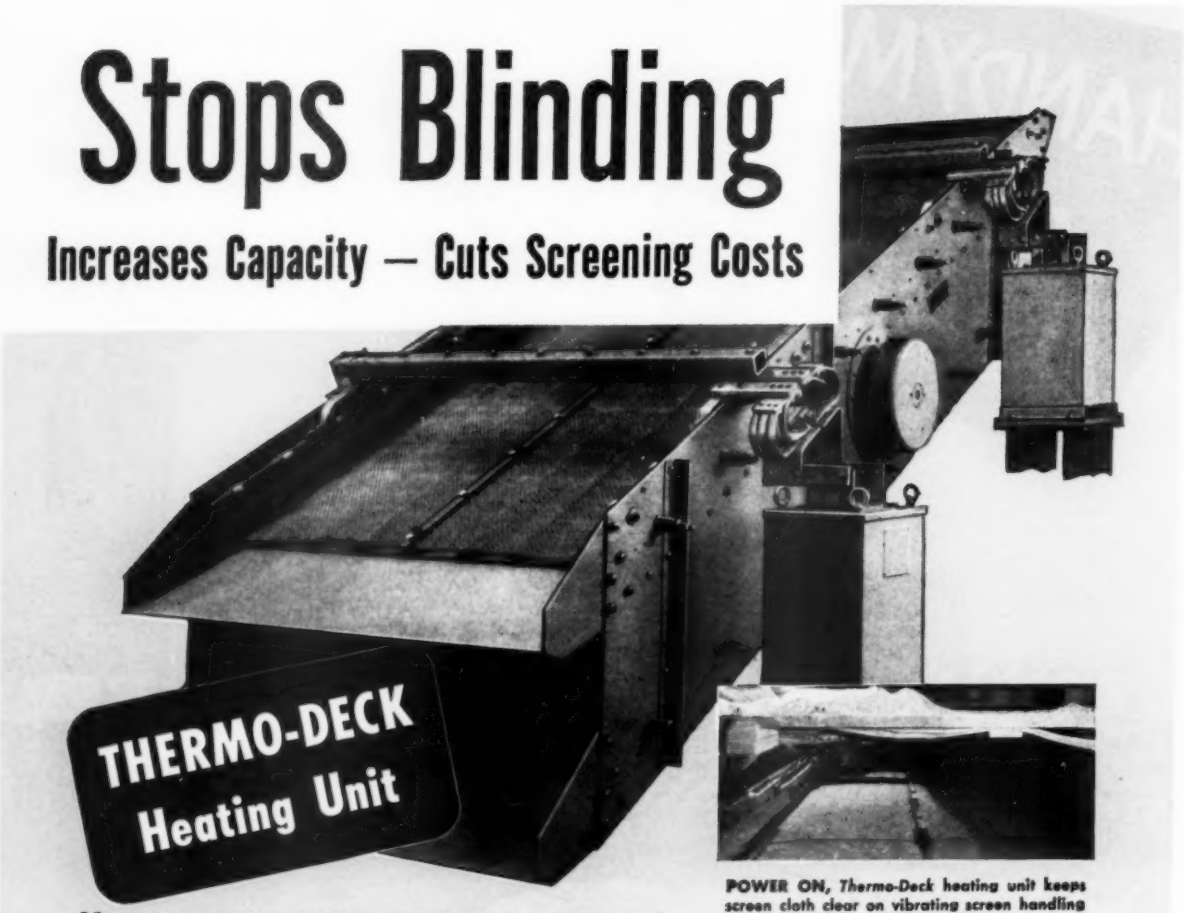
NORTHWEST ENGINEERING COMPANY
1514 Field Building, 135 South LaSalle Street, Chicago 3, Illinois

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

Stops Blinding

Increases Capacity — Cuts Screening Costs



You can screen fine, moist material *continuously* with a *Thermo-Deck* heating unit. No down time required to clear fine or medium mesh screen cloth!

Heated screen cloth remains open . . . you get *more* tonnage through the screen and better separation.

Operating records prove that heated wire cloth screens last up to three times longer than non-heated cloth, because they do not have to be pounded free of blinded material. For the same reason, you save man-hours too. These lower costs increase your profits.

The *Thermo-Deck* unit can be applied to Allis-Chalmers screens in the field. See your nearby Allis-Chalmers representative for complete details. Or write Allis-Chalmers, Milwaukee 1, Wis., for Bulletin 07B7812.

A-4272

POWER ON, *Thermo-Deck* **heating unit keeps screen cloth clear on vibrating screen handling fine, moist material.**

POWER OFF, troublesome blinding occurs. This view shows same screen as above, with *Thermo-Deck* **unit shut off.**

For Intermittent Feed... ADD A *STA-KLEEN* DECK

If feed is intermittent, fine material may bake on the wire cloth during interruptions in feed. Heat which ordinarily is absorbed by moist material increases the temperature of the wire cloth sufficiently to cause any fine material to bake on. The addition of a *Sta-Kleen* deck effectively prevents this. Bouncing rubber balls between the screen cloth and a ball retaining deck clear the cloth of baked-on particles.

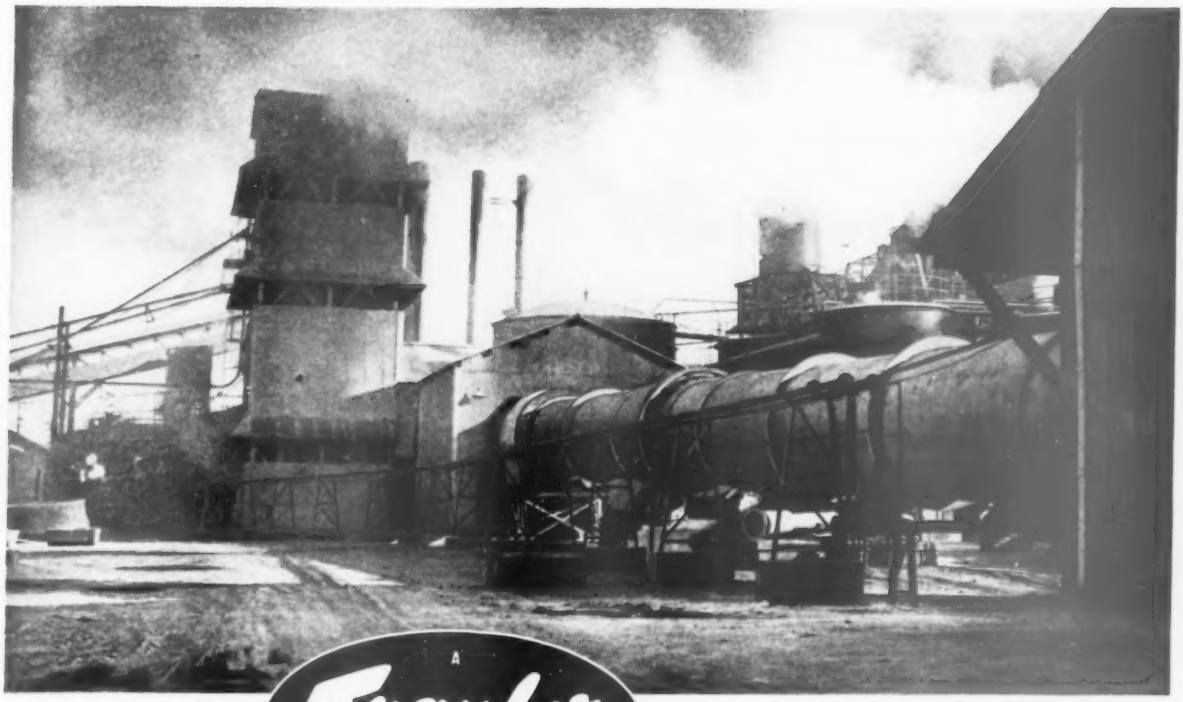
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Thermo-Deck and Sta-Kleen are Allis-Chalmers trademarks.

only one

Rotary Kiln for Thermo-Processing is right for you



A **Traylor** LEADS TO GREATER PROFITS

TRAYLOR ENG. & MFG. CO.
695 Mill St., Allentown, Pa.

THERMO-PROCESSING is a big part of my production cost. So, I need the most efficient equipment I can get. Send me your new bulletin 1115 on Traylor Rotary Kilns.

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Company _____

Address _____

Sales Offices: New York • Chicago • San Francisco
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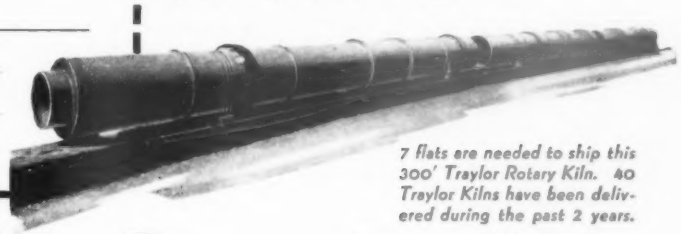
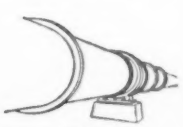
For greatest efficiency, a Rotary Kiln must be designed specially for its job. With all the possible variations of basic kiln design, it takes an expert to tell what's best for you. With hundreds of Traylor Kilns now in operation, Traylor engineers have built up a vast reservoir of experience to draw on in building your "Traylor-Made" Kiln.



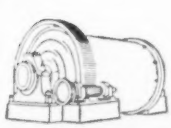
7 flats are needed to ship this 300' Traylor Rotary Kiln. 40 Traylor Kilns have been delivered during the past 2 years.

Primary Gyratory Crushers



Rotary Kilns

Secondary Gyratory Crushers



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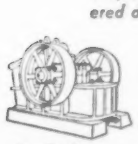
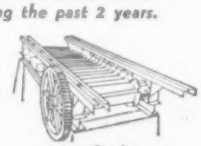
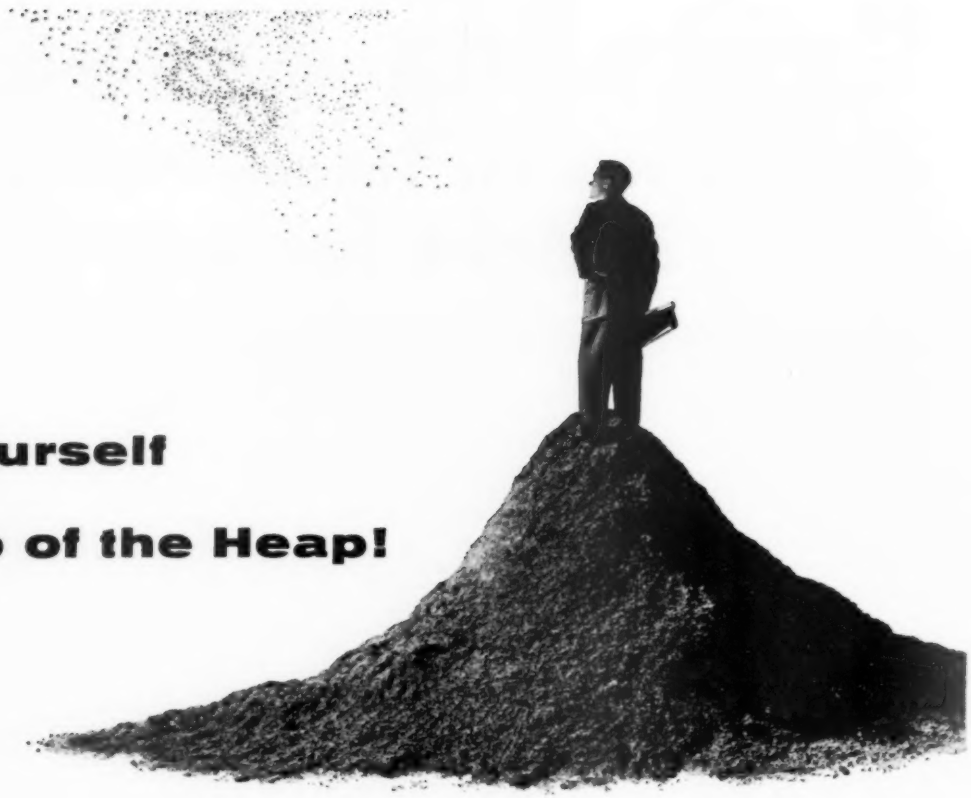


Jaw Crushers



Apron Feeders



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You can collect big money simply by collecting the valuable dust that's usually wasted in your plant's operations!

How much? Buell equipment frequently collects as much as 40 tons a day. Convert that into cash and you can see what you're missing!

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Motorists: here's proof...

Gulf's cleaner-burning, super-refined gasoline solves today's No. 1 engine problem!

This lamp is burning the "DIRTY-BURNING TAIL-END" of gasoline which GULF refines out
This lamp is burning NEW SUPER-REFINED GULF NO-NOX, the cleaner-burning super-fuel

Laboratory tests promised...

. . . these *immediate* and *lasting* benefits from this new, super-refined fuel:

More complete engine protection than from the so-called "miracle-additive" gasolines. Why? Because Gulf refines *out* the "dirty-burning tail-end" of gasoline (the No. 1 troublemaker in high-compression engines)—and then treats this new Super-Refined NO-NOX to give it a *complete range of protective properties*. It protects *every* part it touches against carbon, rust, gum.

Extra gas mileage in all your everyday, short-trip, stop-and-go driving.

No knock, no pre-ignition. Why? Because the anti-knock power of new Gulf NO-NOX has been stepped up to an all-time high.

Stall-proof smoothness. Instant *starts*, too—and fast, fuel-saving warm-up.

That's why new Super-Refined Gulf NO-NOX gives your engine more power-with-protection than you've ever known.

Road tests proved...

These cars, powered by New Gulf No-Nox, actually performed better than new . . . after 15,000 miles!

True! After 15,000 miles per car—covering all conditions of city and country driving—Gulf test cars showed these results:

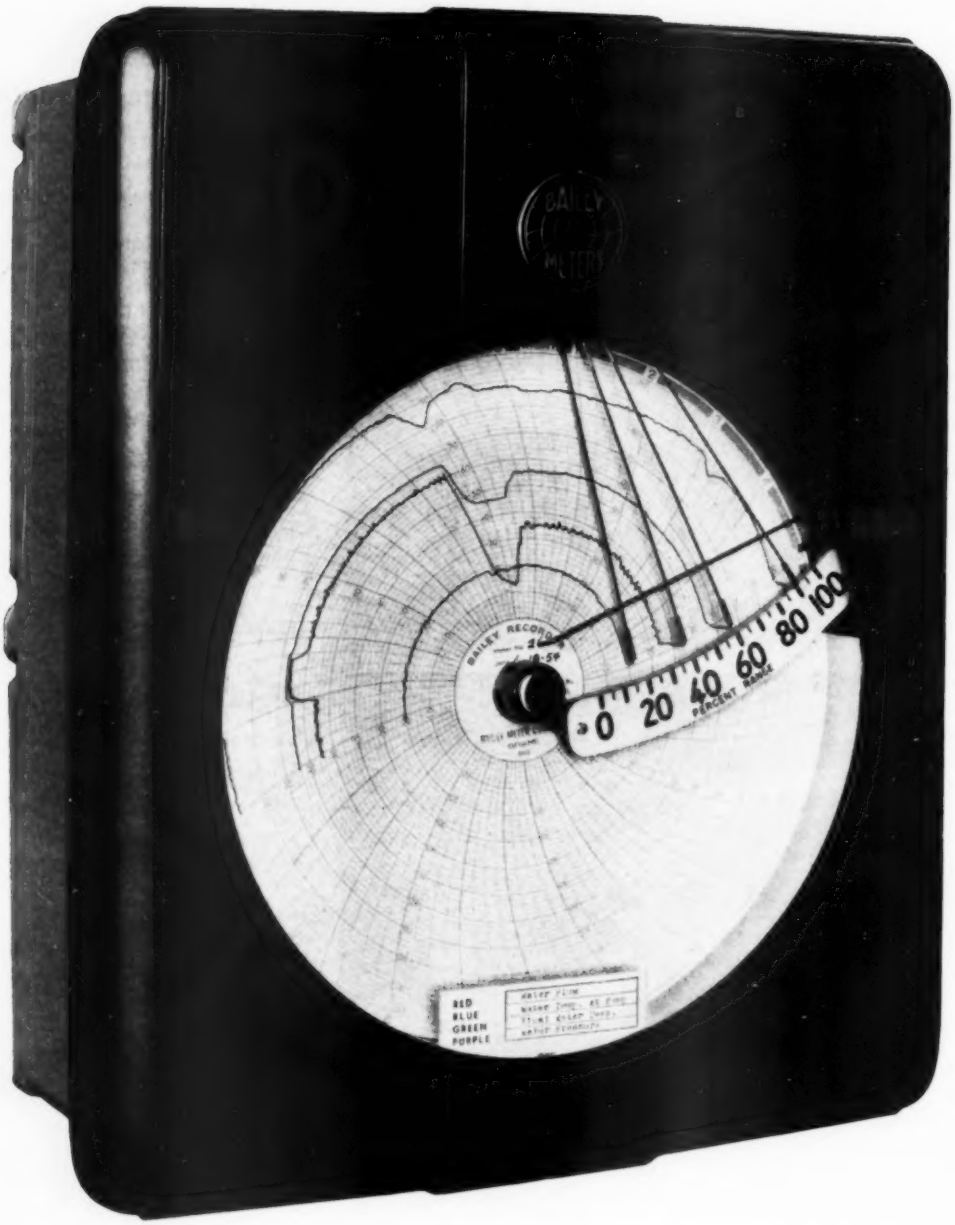
- Higher-than-new horsepower!
- Better-than-new on gasoline mileage!
- And not a single trace of carbon knock or pre-ignition at any time—even on the steepest mountain grades!

COMPLETELY NEW! SUPER-REFINED

New Gulf No-Nox

THE HIGH-EFFICIENCY GASOLINE

Announcing the New Bailey

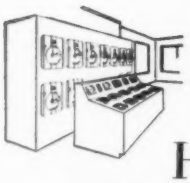


The New Bailey Recorder provides continuous chart records of any four measured variables:

% combustibles	density	flow	pH	ratio	speed
combustion	differential	liquid level	position	smoke density	temperature
conductivity	draft	% oxygen	pressure	specific gravity	vacuum

Recorder for—

Pneumatic and Electric Transmission Systems



Here is a panel-mounted recorder that offers new versatility never before available in a single instrument. Its unique interchangeable-unit design permits recording up to four measured variables, regardless of their nature or the location at which they are measured.

Individual plug-in type pneumatic or electronic receivers—and corresponding integrators—are interchangeable in the four identical frame-slots, permitting any combination of four pneumatic or electronic signal receivers, *or any two receivers and their two integrators.*

For the first time you can record four telemetered measurements on a single 12-inch circular chart—with a minimum of first cost and installation expense, and a maximum of operating economy. Low cost multi-purpose components permit fast and easy adaptation to new or changed process cycles.

Check These Outstanding Advantages

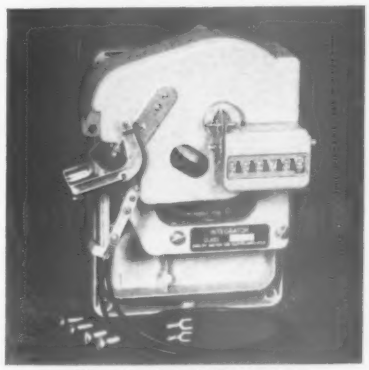
Extreme Flexibility of Application is provided through the use of pre-calibrated plug-in type units—pneumatic or electronic—to record any measurable variables, in any combination. For example, you can "plug-in" pneumatic receivers along with electronic receivers to record up to a total of four variables on the same chart. Or your recorder casing can accommodate two integrators and their two corresponding recording receivers for rate of flow.

Faster, Easier Servicing of instruments is possible because of the new, sealed ink sacs and capillary pens. Under normal conditions ink sacs need be replaced only once each year. There is no day-to-day inking of pens.

Faster, Easier Ordering from Stock results from the unique standardized unit design. You can select any combination of recording receivers to fit your needs, by reference to simplified catalog specifications, and receive shipment without the delays ordinarily resulting from custom assembly. Complete interchangeability of plug-in type components simplifies stocking of spare units.

G34-2

Plug-in type pneumatic receiver



Plug-in type integrator

Plug-in type electronic receiver

Write for complete specifications—use handy coupon below

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METER COMPANY

1039 IVANHOE ROAD

CLEVELAND 10, OHIO

Controls for Power and Process

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TEMPERATURE
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Please send me product specifications on the new Bailey Recorder, as follows:

☐ With Pneumatic Receivers—Spec. P11-5
☐ With Electronic and Pneumatic Receivers —Spec. E12-5

Name_____
Title_____
Company_____
Street and Number_____
City_____ Zone____ State_____

KOEHRING COMPANY Milwaukee 16, Wis. Subsidiaries: JOHNSON PARSONS • KWIK-MIX

BIG-PRODUCTION TEAM — Loading rock, Koehring 1½-yard shovel (above) is teamed up with Koehring Dumpsters.®

Measure excavators by

price per pound of lifting capacity

In analyzing shovel operation, you will find that price per pound of lifting capacity on crane rating is also an excellent measurement of excavator value.

Remember, lift capacity is *work capacity*. Obviously, the machine with the heaviest lift rating not only picks up larger crane loads — it also has more strength, extra speed and stability to handle bigger loads faster with every excavator attachment.

Check Koehring lift ratings shown below — then ask your Koehring distributor to give you the figures on price per pound of lifting capacity.

Compare for yourself:

KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAP.*
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	?

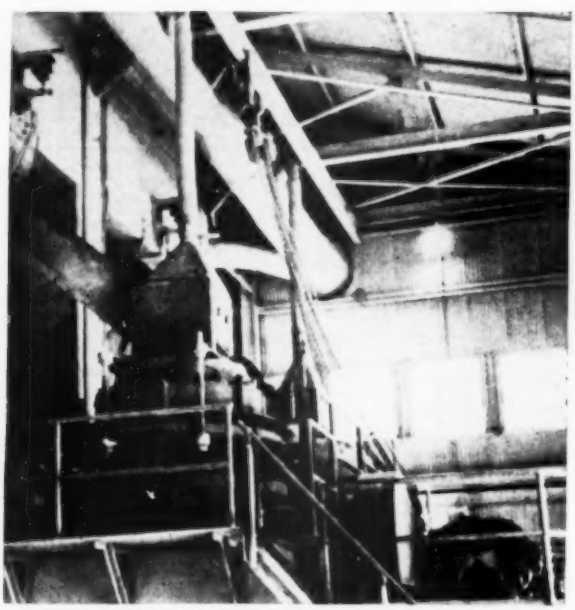
**Figures available on request—ask your Koehring distributor to see them.*

KOEHRING HEAVY DUTY

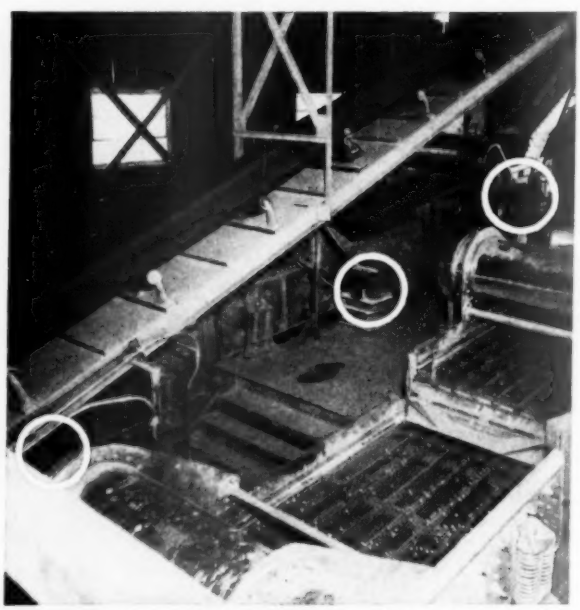
ENGINEERING REPORTS:

ENTIRE PLANT of Dolese Bros. Co. is operated with General Electric motors and control, co-ordinated to meet diverse, yet exacting specifications. Shown here are earthen ramp and the crushing building (right) and stockpiling facilities (left).

New 750-t.p.h. crushed-stone plant



1 STONE COMES TO THIS CRUSHER on conveyor powered by G-E 100-hp a-c motor (not shown). Solenoid trip (top left) controls feed automatically. Crushed stone is then removed by conveyor driven by G-E motor at lower right.

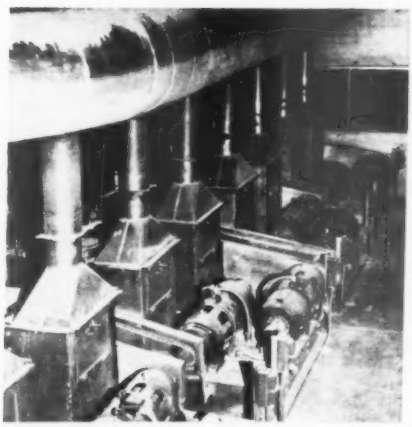


2 SCREENING IS CONTINUOUS to maintain high production rate. All screens are operated by G-E Tri-Clad* totally enclosed motors (circled), which keep production going under all operating conditions.

*Reg. trade-mark of General Electric Company

MASTER CONTROLS for whole operation are easily handled by one man. Desk-type benchboard controls screening process; vertical panel controls all blending and loading. All controls are located in air-conditioned central control room.

accurately controlled by one man



3 FEEDERS SUPPLY BLENDING process by belts driven by this battery of General Electric d-c gear-motors, powered and controlled by G-E speed-variators.

Dolese Bros. Co. plant completely electrified with G-E drives for peak output

One of the most modern crushed-stone plants in the world, Dolese Bros. Co. of Richard Spur, Okla., relies on an electrically co-ordinated plant-flow system for balanced production at top capacity of 750 t.p.h. Nerve center for this fast-moving operation is General Electric centralized control, which accurately integrates all production operations with the Hewitt-Robins materials-handling system.

Each process is pre-set, and controlled with finger-tip sensitivity from the central control room to meet any one of an almost infinite variety of stone-size combinations. Money-saving, production-boosting G-E motors and generated voltage control are used for the entire system. Result is extra flexibility and smooth flow of production through the plant.

FOR HIGHER OUTPUT, MODERNIZE ELECTRICALLY. To eliminate bottlenecks and increase production in *your* plant, G-E application engineers are ready to work with you and your equipment manufacturers. Contact your nearest G-E Apparatus Sales representative today. General Electric Company, Schenectady 5, N. Y. 658-12

Engineered Electrical Systems for the Rock Products Industry

GENERAL ELECTRIC

7 solid reasons why it pays to standardize on LINK-BELT IDLERS

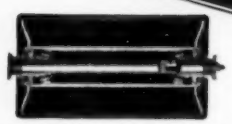
1 STRONG, RIGID FRAMES support rolls in perfect alignment. Rolls are securely held in place but can be easily removed for inspection and service.

2 CONCENTRIC ROLLS have smooth surfaces and rounded edges. Machine-made, continuous welds prevent entrance of dirt and moisture—assure hop-free rotation.

3 HUSKY, HIGHEST QUALITY BEARINGS, free and easy turning, provide concentricity and perfect alignment for smooth operation, minimum belt wear, low power requirements.

4 SAFE, CONVENIENT GREASE FITTINGS provide ease of lubrication. Extensions can be furnished for greater accessibility in out-of-the-way locations.

5 POSITIVE, COMBINATION GREASE SEAL unit retains lubricant, prolongs bearing life. The most effective seal offered in idlers today!



6 ROLLS consist of a counterbored outer shell plus a full-length, heavy central tube of $\frac{3}{16}$-in. steel. Both tube and shell are welded to dished steel heads to maintain balance and bearing alignment.

7 HEX NUTS provide bearing adjustment at shaft ends and prevent rotation in service. Nuts prevent bracket from spreading under unusual impact.

Get the right idler from industry's most comprehensive line

Link-Belt makes more than 500 belt conveyor idlers in 34 types. You can select from light, medium or heavy-duty 20° troughing idlers, two types of 45° idlers, flat belt, belt training, rubber cushion and the new Link-Belt variable troughing idler. Most are built in a broad range of roll diameters and belt widths with matching return idlers. Ask your Link-Belt sales representative or distributor for new 48-page Book 2416.

LINK-BELT

BELT CONVEYOR IDLERS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.415

Why the big operators are buying the UNIVERSAL 880 Senior "R"

No other gravel crushing plant in its weight class can challenge the Senior "R"'s output.

1. **More Tonnage From Screen —** 4' x 12' screen with full 48 square feet of screening area **plus** inclined mounting gives 25% or more output.
2. **Top Primary Output —** Universal 1036 overhead eccentric force feed jaw crusher. The top producing jaw on the market.
3. **Maximum Secondary Production —** 30" x 24" roll crusher. The largest offered in a plant of this weight. Feed design uses the full 24" width of the roll shells.
4. **Big 30" Conveyors —** You need extra wide conveyors to handle the Senior "R"'s high output . . . and you get them! Channel frame design for ruggedness — not formed frames.
5. **All This In A Portable Plant —** designed to meet state highway weight restrictions.
6. **Low Initial Cost —** Low maintenance.

NO OTHER PLANT HAS ALL THESE FEATURES

These are but a few of the reasons why the big operators, who keep a careful check on operating costs and production records, buy the Senior "R". Compare it feature for feature with other plants and prove this to yourself . . . UNIVERSAL'S THE BUY! For complete information see your nearest Universal distributor, or write to Universal Engineering Corporation, 631 C Avenue N.W., Cedar Rapids, Iowa.

PETTIBONE
UNIVERSAL
In Cedar Rapids Since 1906

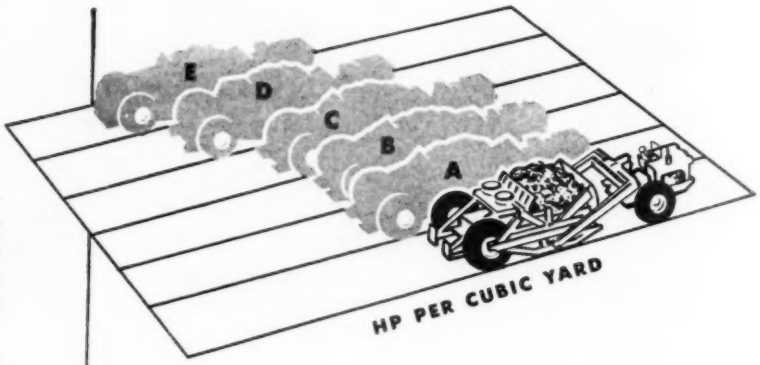
UNIVERSAL ENGINEERING CORPORATION

617 C Ave., N.W., Cedar Rapids, Iowa

A Subsidiary of Pettibone Mulliken Corporation, 4700 W. Division St. Chicago 51, Illinois

COMPARE POWER, BALANCE AND TRACTION AND

Why Allis-Chalmers Motor Scrapers



Examine the Allis-Chalmers TS-200 or TS-300 Motor Scraper point by point, feature by feature. Then let your Allis-Chalmers dealer demonstrate what these features mean to you in terms of bonus yardage and dependable performance.

See how fast Allis-Chalmers Motor Scrapers accelerate to "get the jump" on normal production from the moment they leave the pusher. See how safely they high-ball with a full load . . . how fast and steady they pull through the deep fill and return, up grade, to start a new cycle. Compare these Motor Scrapers on the basis of work done per dollar of investment. We think you'll agree an Allis-Chalmers Motor Scraper is your *number one* earth-moving value.

ACCELERATES FAST

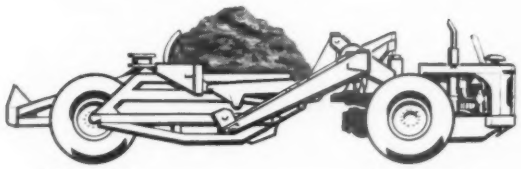
The TS-200 develops 17.6 hp per cu yd struck capacity . . . the TS-300 develops 20—the highest ratios in their respective classes. With more power to move the payload, these machines get away from the pusher *fast* and maintain high average speeds throughout the entire cycle.

PERFORMANCE MAKES DOLLARS WHEN DESIGN

YOU'LL SEE

Out-produce

WEIGHT DISTRIBUTION LOADED

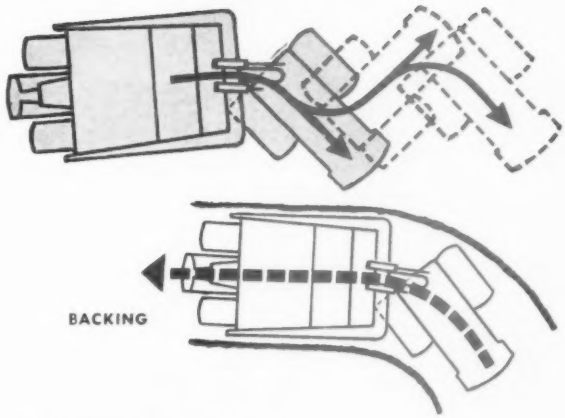


50 PERCENT 50 PERCENT

HIGHBALLS WITH THE PAYLOAD SAFELY

Loaded, the Allis-Chalmers Motor Scraper has equal weight on all four tires. This ideal weight distribution, together with low center of gravity, direct hydraulic steering which eliminates jackknifing, and big air brakes on all four wheels, allows the Allis-Chalmers Motor Scraper to take advantage of its high hp ratios by maintaining fast, yet safe haul speeds.

DUCK-WALKING



MANEUVERS EASILY

There are no steering brakes to rob you of tractive power. Instead, direct hydraulic rams turn the tractor in the desired direction of travel. Steering is sure and positive—even going down extremely steep slopes in loose footing.

By swinging tractor left and right with the steering rams, the Allis-Chalmers Motor Scraper can duck-walk through heavy going where others bog down.

Backing up in close quarters is simple. Two-wheel tractor has complete control over scraper body . . . can even change directions without forward or backward movement.

WEIGHT DISTRIBUTION EMPTY

34 PERCENT 66 PERCENT

COMPLETES THE ROUND TRIP QUICKLY

The return trip from the fill is usually uphill. That's where two-wheel design pays off. When empty, 66 percent of the Motor Scraper's weight is carried on the traction wheels. There are no front wheels to rob drive wheels of tractive weight or to create rolling resistance in heavy going. This enables the Motor Scraper to make the round trip faster and usually in higher gear than other units.

MAKES SENSE

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Enough to make the difference...

ANOTHER HUDSON

the Seal of Certified of the U. S. Testing

Extra Points for HUDSON
QUALITY CONTROL
from tree planting to sacks, Hudson is an integrated operation.
WRITTEN GUARANTEE
with your assurance of satisfaction in advance.
RIGID INSPECTION
a 39-point inspection and test program.
NON-SLIP INK
available to you at no extra cost.
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for extra display appeal and increased sales for your product.
TIME-MOTION SERVICE
movies of your packaging operation for efficiency study.
SPECIAL SERVICES
on delivery, storage and inventory control problems.
PROBLEM PRODUCT PACKAGING
specialists to study your requirements.

INDEPENDENT PROOF THAT THE SACKS THAT PROTECT YOUR PRODUCT ARE CONSISTENTLY THE BEST THAT MONEY CAN BUY

Users long believed that Hudson Multiwall Sacks offered the surest, safest protection for their products. To prove it we went to the independent testing service, The U. S. Testing Company, asked them to find out.

To make their comparisons, U. S. Testing buys in the open market samples of Hudson Multiwalls, along with sacks of other manufacturers — tests them by standards far more severe than the toughest service they'll ever get in actual use.

The result: of all multiwall sacks tested, only Hudson received the coveted Seal of Approval. And note that this testing is continuous . . . new tests are made *each* month. The U. S. Testing Seal, found only on Hudson Multiwalls, is your proof that Hudson sacks are *regularly* tested and certified for performance.

For you: this means you can now assure your customers that your products receive the same fine quality control from raw material to *delivered* product. You can show dramatically with the Hudson Multiwall Seal of Approval that product, production and packaging are consistently the best money can buy! Your Hudson representative can give you the details behind "certified" performance!

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RP-10

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YES! Please send us Hudson's 46-page illustrated book on "What to Look for in a Dependable Source of Supply."

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2-way radio control for Biqqer Profits!

In the yard . . . and in the field . . . coordinate Ready Mix concrete operations with

Motorola 2-way Radio

Wherever you have several vehicles operating over a wide area—2-Way Radio is needed for speed and real efficiency. Only when dispatchers and drivers are in constant touch can they work as a team.

With Motorola radio, you gain unbroken control over your expensive personnel and equipment—eliminating most of the blind chances that threaten your profit on the job. No more "unexplainable" delays due to traffic or breakdown. No more "lost" trucks—for now you can get effective action to stop these work-stoppers in a matter of seconds.

Installed, operated, and maintained, your radio will cost about one dollar per day per truck. At $8.00 per hour operating cost on each truck, if you save only seven minutes per day, you've paid for the radios and gained a multiple return in other directions.

So don't delay! Find out exactly how Motorola can do a job for you. Let us send an engineer to give you the whole, straight facts—and remember he's from Motorola—the oldest and largest organization in the business. He'll put your interests first, and see that you're treated right!

national Motorola RADIO COMMUNICATIONS service

Motorola Communications & Electronics, Inc.

A SUBSIDIARY OF MOTOROLA, INC.

4501 W. Augusta, Chicago 51, Ill. • Rogers Majestic Electronics Ltd., Toronto, Canada

drive it anywhere

— get faster set-ups, better hole spacing, greater footage, better fragmentation, lower costs

Le Roi-CLEVELAND

T286 Self-Propelled Dual Drill Rig

It's 2 Le Roi-CLEVELAND patented air feeds and drills with air-motor booms mounted on a 25-hp tractor

3 speeds forward — 1 speed reverse

USE a Le Roi-CLEVELAND T286 and watch your men go places — go places they couldn't get to before on wagon-drill jobs. The T286 is self-propelled; you can drive it over almost any terrain — and tow the compressor right along behind. Your men can make their set-ups faster — spot holes easier for better fragmentation — without tugging or pushing.

Besides being self-propelled, the T286 drills in any direction — at any angle — uses less air. One Le Roi Airmaster 600 cfm Compressor provides all the low-cost air you need.

Have your nearby Le Roi distributor tell you *all* the reasons why it pays to use the Le Roi-CLEVELAND T286 Self-Propelled Dual Drill Rig. Write for Bulletin RD-21.

LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.

CLEVELAND ROCK DRILL DIVISION 12500 Berea Road, Cleveland 11, Ohio

Plants: Milwaukee, Cleveland and Greenwich, Ohio

Relief... for a production pain

What's your particular "ache"? Looking for ways to cut costs... improve production... speed plant operations... reduce maintenance costs?

Here's a prescription that can provide an effective solution for you... the specialized service offered by your Chain Belt Field Sales Engineer and the outstanding performance of Chain Belt Equipment:

for example: If bucket elevator chain breakage is your "headache," Rex® S-858 and S-856 chains will provide relief. These precision-made steel chains will not break... properly applied, they may *wear* out after the longest possible service life. They will outlast... outwear any other chains built for bucket elevator service.

for example: If you're having trouble with your chain drives, Rex Chabelco® Steel Chains are your answer. These rugged chains are designed and built for the toughest service, especially where dust, dirt or heat is a problem. They stand up under heaviest loads... transmit more h.p. per dollar.

for example: If maintenance is your problem, here's a suggestion. Use Rex Split Hardened Rim Traction Wheels and Sprockets. Just install the body, then each rim segment. Replacement of rim section can be done without removing the chain. Down time can be reduced with these long-wearing traction wheels and sprockets.

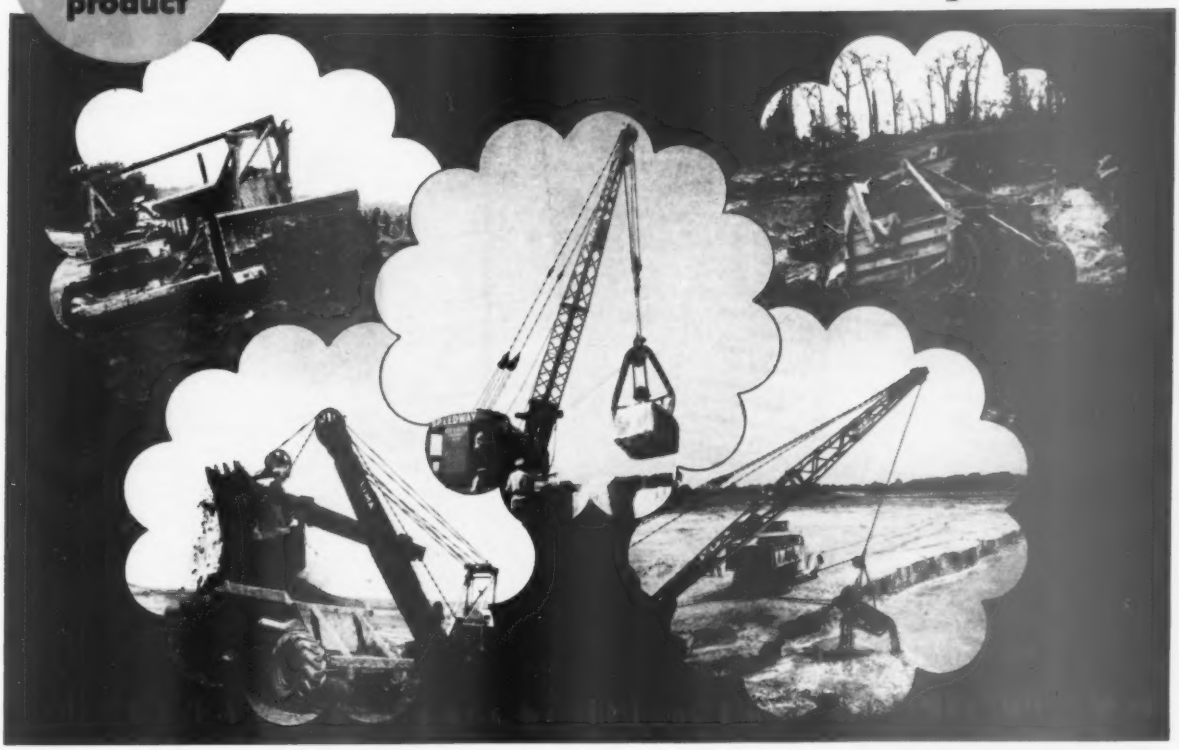
Whatever your needs... drive chain, conveyor and elevator chain, complete elevators, belt conveyors, feeders, roller bearings, buckets or sprockets, you'll relieve those production pains by looking to Chain Belt. See your local Field Sales Engineer or write direct to Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.

CHAIN BELT COMPANY

District Sales Offices and Distributors in all Principal Cities

an ACCO product

American Cable "Tru-Lay" "Green Strand" Wire Rope



If you operate any of these machines, this information may save you money on your wire rope purchases...

• Every machine you use wire rope on has characteristics which must be considered in choosing the rope which will give you the longest service. For instance, the bulldozer and carrier scraper have extremely small sheaves which bend the rope sharply and small drums which cause very severe abrasive and crushing actions on the rope. So the best rope is "Streamlined" Flattened-Strand.

Regular crane service is usually not too hard on rope but sometimes the sheaves are rather small and there is a great deal of whipping and frequently twisting to contend with.

Shovels have big sheaves but are subjected to shock loads and jerks which can yank a rope in two. Draglines also offer a real challenge. Usually they have smaller sheaves. The rope drags in the dirt and it gets one bad shock after another.

For every one of these machines there is one particular Tru-Lay Preformed "Green Strand" wire rope construction and grade which will give better service and save you money. The problems have always been to decide on which construction you need—and where to get it. American Cable has eliminated these problems by setting down correct recommendations of what ropes will cost you least to use, and by making them available at your nearby American Cable distributor.

Get a copy of this FREE book!

"Wire Rope Recommendations for General Contractors," contains recommendations of the correct ropes for every machine you operate. Photographs and alphabetical listings make it easy to use. There is also some interesting information on ACCO Registered DUALOC Boom Cable Assemblies.

See your American Cable distributor today or write our Wilkes-Barre, Pa., office for a free copy of this useful, money-saving booklet.

ACCO

American Cable Division

AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

plus ACCO Registered Wire Rope Slings

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Our new hard-facing manual has separate sections showing typical hard-surfacing applications in SEVEN basic industries. Every procedure job proved.

Tells which alloy to use and how to apply it.

Describes complete line of Victor alloys for gas or electric manual and automatic welding.

Printed on heavy paper with durable covers, for field use.

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TYPICAL MANUAL PAGE

Illustrates the part (1) . . . the alloy Victor recommends (2) . . . and how to apply it (3)

Profitable dealerships open; inquire now!

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VICTOR EQUIPMENT COMPANY
ALLOY ROD AND METAL DIVISION
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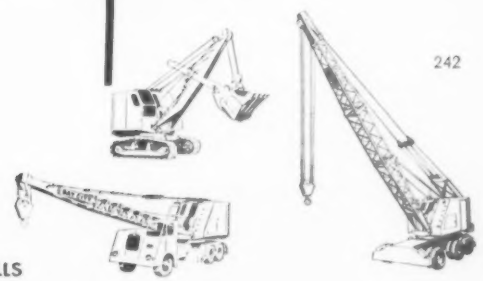
Mfrs. of welding & cutting equipment; hardfacing rods; blasting nozzles.

new 1½ yard BAY CITY . . . ideal for tough quarry work

In the quarry and on many other tough jobs, Bay City Shovels are proving their honest dependability day after day. For instance, below is a new model #70, working for the Essex Sand and Gravel Company at Peabody, Massachusetts. This low-weight, low-price #70, rugged enough for quarry work, will handle any excavating job. Powered by Cummins Diesel with hydraulic coupling, the #70 as a shovel weighs 44 tons and is equipped with 23 ft. boom, 18 ft. sticks, and a 1½ yard rock-type dipper. Let us tell you more about this fully convertible shovel-crane which is available with standard or long crawlers. BAY CITY SHOVELS, INC., Bay City, Michigan.

WRITE FOR CATALOG 70/700-A

This 16-page catalog is yours for the asking. It tells the story of the 70/700 in pictures and text. Write for your copy today—no obligation.



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BAY CITY

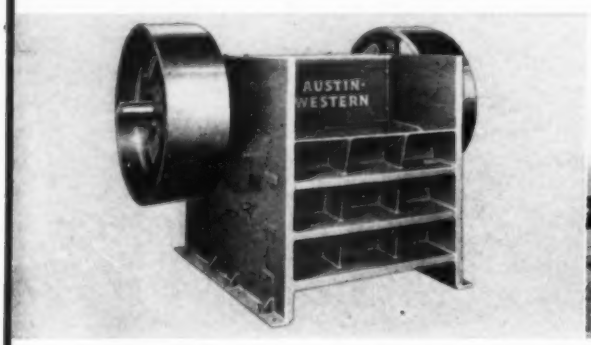
BAY CITY SHOVELS, INC. • BAY CITY, MICHIGAN

SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS

Compare jaw crushers...the guts of every plant... and you'll pick **AUSTIN-WESTERN!**

STUDY THIS FACTUAL COMPARISON OF JAW CRUSHERS BEFORE YOU BUY ANY PLANT

COMPARE...	A-W	Make "X"	Make "Y"	Make "Z"
Oversize shafts of Chrome Vanadium steel, the toughest and strongest material available.	Yes	No	No	No
Bearings located so center line of bearing proper comes within side plate. Thus side plate bears thrust of crushing load.	Yes	No	Yes	No
Machined steel toggle plate for absolute protection instead of cast iron.	Yes	No	No	No
All bearings of anti-friction self-aligning type.	Yes	Yes	Yes	No
All jaws and cheek plates made of manganese steel for maximum life.	Yes	Yes	No	Yes
Steel plate crusher frame for high strength without weight of cast steel frame.	Yes	No	Yes	No
Total	100%	33⅓%	50%	16⅔%



Austin-Western 1036
Roller Bearing Jaw Crusher

Austin-Western "101" Portable Crushing and Screening Plant with 1036 jaw crusher

The jaw crusher certainly is the *guts* of any crushing plant because it is the one unit that has to take constantly rough treatment. Also trouble-free operation of the jaw crusher is vital for profitable production. That's why it is so important for you to *compare* jaw crushers carefully before choosing from any crushing plants.

When you do, we are confident that factual evidence (see chart), will convince you that you will get better performance and longer life with an Austin-Western plant.

- *For more facts on any of the above points or copies of our new booklets, please write: Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio, or your nearby Austin-Western distributor.*

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

Austin-Western
CRUSHING, SCREENING and WASHING EQUIPMENT

BALDWIN BLH LIMA HAMILTON
Construction Equipment Division

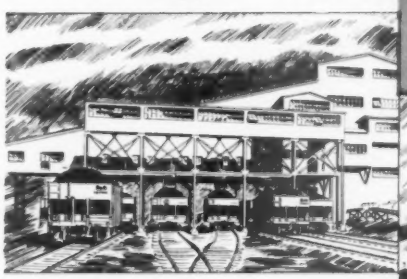
BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

Are you keeping FUEL COSTS as low as you can?

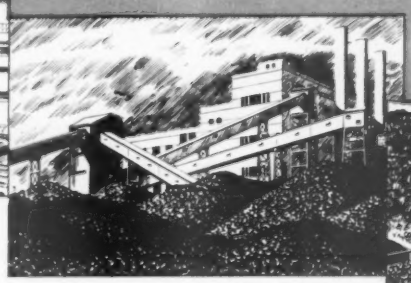
ASK OUR MAN!

He will demonstrate with *facts* why your best bet is bituminous coal. He will help you find the right kind and size of coal for your specific need; and he will show you up-to-the-minute ways of burning it efficiently and economically.

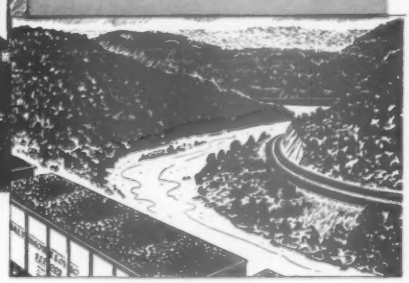
In Baltimore & Ohio territory, close to industry's doorstep, are bituminous coals in all varieties—for power, coking, steam, heating. Produced in highly mechanized mines, these coals are low in cost and uniform in size and quality. With the modern burning equipment now available, the efficiency and cleanliness of bituminous coal will amaze you!



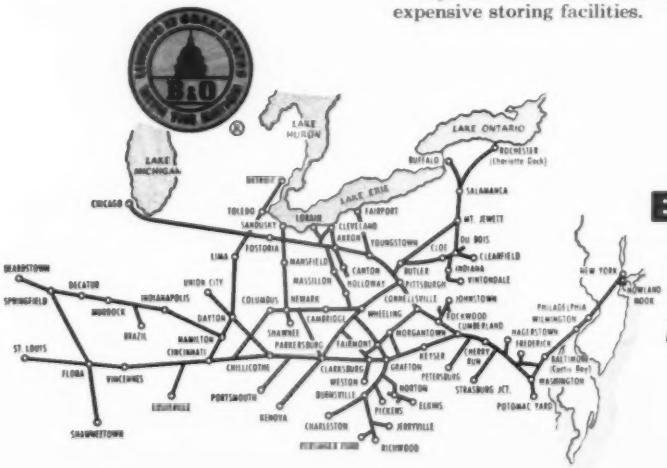
Surprising economy. Conveniently accessible and highly efficient in modern use, bituminous coal from mines on the B&O keeps fuel costs low.



Convenient storage. Bituminous coal can be stored anywhere with safety. This eliminates the need for expensive storing facilities.



Reserves for centuries. Plants built for bituminous coal are assured a continuity of fuel supply regardless of emergencies. On the B&O alone, are reserves estimated at 25 billion tons!



Baltimore & Ohio Railroad

Bituminous Coals for Every Purpose

MURPHY DIESEL POWER

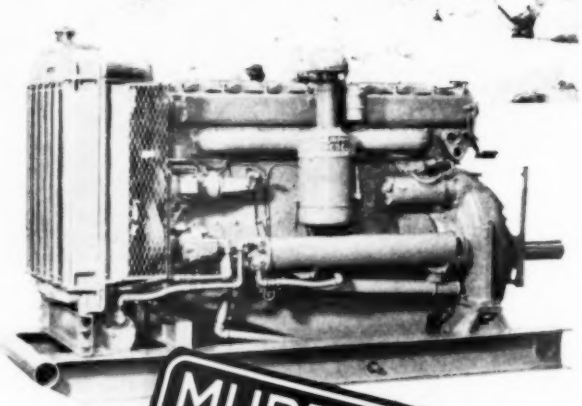
all the way on this job...

. . . turns out over 100 tons of limestone and flint rock per hour

● From this Kansas pit, W. O. Homer of Junction City, Kansas, is turning out 100 tons of limestone and flint per hour, with flint accounting for about 20% of the total. Mr. Homer is doing this job with a Murphy Diesel powered Northwest shovel and a Murphy Diesel powered Universal portable crushing plant. So it's Murphy Diesel all the way on this job.

If you're looking for dependable output at maximum operating economy, profit by the experience of pit and quarry operators everywhere, and put Murphy Diesel power to work for you. It's your best bet for getting the most rock per gallon of fuel and you'll particularly like the trouble-free service and freedom from costly downtime.

Talk over your requirements with your Murphy Diesel Dealer and ask him to show you what Murphy Diesel power can do for you.



297

Heavy duty power

for rock crushing

Murphy Diesel Engines and Power Units are available in sizes from 90 to 240 H.P. Engine speeds are 1200 and 1400 rpm. "Packaged" generating units are available with capacities ranging from 60 to 154 K.W.

MURPHY DIESEL COMPANY
5315 W. Burnham Street
Milwaukee 14, Wisconsin
Sales, parts, service throughout the nation

Cedarapids

Built by IOWA

STATIONARY AGGREGATE PLANTS

"Tailor-Made" FOR YOUR INDIVIDUAL PROBLEM

What's *your* aggregate problem? Every Stationary Plant installation presents a different problem, both for specification and quantity, and every Cedarapids Plant is "tailor-made" by engineers who have an intimate knowledge of raw materials as well as the desired finished product. It takes this special Cedarapids engineering to squeeze out those *extra* dollar-making tons of capacity, and meet the strictest specifications. Ask your Cedarapids distributor for details.

(*Above*) **CORAL ROCK is crushed at a rate of 180 tons per hour in this Cedarapids Stationary Plant designed for the Deerfield Rock Corporation of Ft. Lauderdale, Florida. This installation consists of a 3240 primary Jaw Crusher, a Reciprocating Feeder, a 3042 Double Impeller Impact Breaker for secondary reduction and 8 conveyors of various types.**

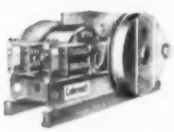
(*Below*) **Crushing GLACIAL GRANITE GRAVEL is another type of operation for which the Stationary Plant owned by E. G. DeLia & Sons, Northville, New York, was designed. The plant contains a 2222 Double Impeller Impact Breaker, a Water Scalping Tank, a 48" x 12' Triple Deck Screen, a Double Screw Sand Washer, two 48" x 10' Horizontal Screens and 6 various size conveyors.**

(*Above*) **A combination of CEMENTED GRAVEL, GRAVEL AND LIMESTONE was the crushing problem solved in California by McCammon-Wunderlich Company's Stationary Plant which includes a primary Jaw Crusher, another Jaw Crusher and Roll Crusher for secondary reduction and two Horizontal Vibrating Screens. All plant conveyors are equipped with Cedarapids-Schrock Motorized Head Pulleys.**

IOWA MANUFACTURING COMPANY • Cedar Rapids, Iowa, U. S. A.

JAW CRUSHERS

DOUBLE IMPELLER IMPACT BREAKERS



ROLL CRUSHERS

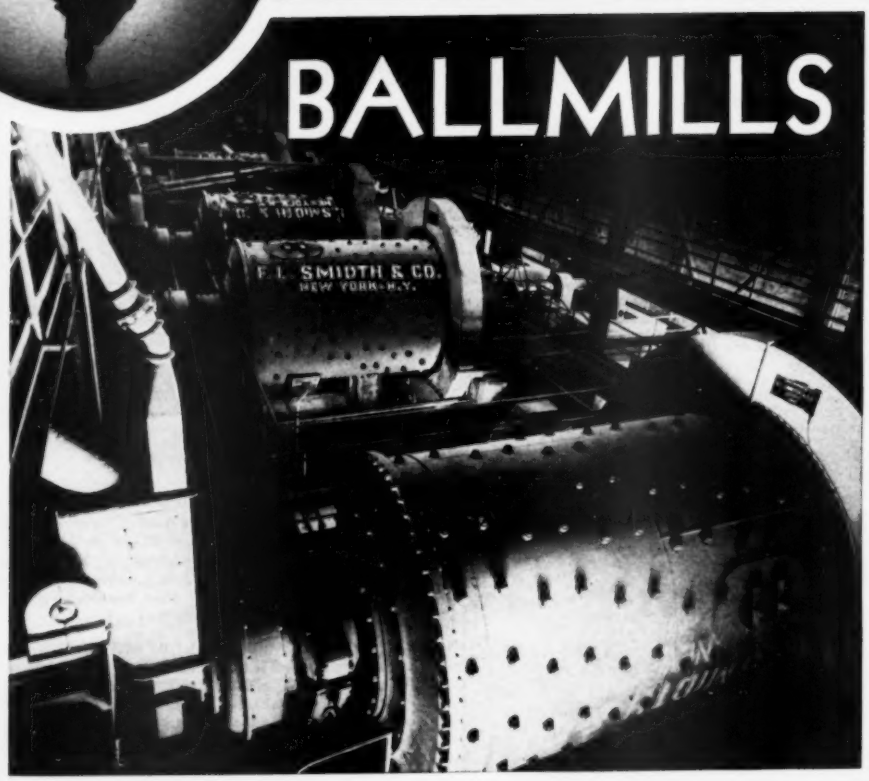
HORIZONTAL VIBRATING SCREENS

MOTORIZED HEAD PULLEYS

HEAVY-DUTY APRON FEEDERS

SMIDTH

BALLMILLS



WET OR DRY GRINDING

OPEN OR CLOSED CIRCUIT

ALSO AIR SWEPT FOR GRINDING AND DRYING

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What's Happening

IN OTHER FIELDS OF INTEREST TO THE ROCK PRODUCTS INDUSTRY

October, 1954

Construction awards for the 37 states east of the Rockies totaled $11,088,-084,000 for the first seven months of 1954, which was a 14 percent increase over the same period of 1953, and also above the previous 7-month high set in 1951, which included $980,000,000 in A.E.C. projects alone, as reported by F. W. Dodge Corp. Seven-month categories, compared with the same period in 1953, were reported as follows: Non-residential, $4,049,522,000, up 9 percent; residential, $4,726,131,000, up 21 percent; and heavy engineering, $2,312,431,000, up 12 percent. Contract awards for the month of July totaled $1,836,935,000, which set a new July high in Dodge's history in construction news and marketing. July categories were: Non-residential, $641,-513,000, down 2 percent from June and 16 percent below July, 1953; residential, $745,440,000, up 3 percent over June and 14 percent above July, 1953; and heavy engineering, $449,982,000, up 26 percent over June and 20 percent over July, 1953.

Changing modes of American life reportedly are reviving the slate mining industry after a long period of low activity. Recent trends in more colorful home-building design, originated in Florida and southern California, are spreading throughout the country, mostly in suburban areas. These new types of residences, featuring outdoor living inside and out, call for multiple uses of colored slate in terraces and patios, floors, walls and roofs. A trade association has been organized to improve and promote the industry as a whole. Other new developments in the slate industry include: Development of a method for converting waste slate into a marketable aggregate for the production of lightweight concrete block; and a new process, which is in pilot plant production, to manufacture a synthetic slate for specialized uses, thus adding another potential outlet for waste slate.

Silicone finishes, which are already performing such diverse jobs as making glass bottles less breakable, reducing vibrations in auto engines, and waterproofing shoes, gloves and other articles of clothing, can now be successfully applied to woolen apparel and upholstery, as recently reported in **The Wall Street Journal.** A new silicone finish, developed by Dow Corning Corp., not only imparts durable water repellency, but adds stain resistance, crease retention and longer wear life to woolens and worsteds, according to a company official, who also predicts that the treatment will go a long way towards enhancing the natural advantages of wool with most of the properties now associated only with the new synthetic "miracle" fabrics.

Workers employed by member companies of the National Safety Council reportedly had the safest year on record in 1953, improving their previous record performance in 1952. They had fewer on-the-job accidents in 1953, and the ones they had were said to be of less serious nature.

Heavy construction awards, nationally, totaled $8,866,524,000 for the first 32 weeks of 1954, as reported by ENGINEERING NEWS-RECORD. This was 7 percent below the $9,495,130,000 reported for the same period of 1953.

President Eisenhower's proposal to spend an extra $50 billion on the nation's highways over the next ten years will mean an important boost for highway construction, but also poses a host of problems, as was recently pointed out in **Engineering News-Record.** The president has called for cooperation and help from the states in working out details of an adequate road program which, he says, is necessary to raise productive efficiency of the nation, to cut the annual highway death toll and to meet demands of defense. With these stated objectives, he has asked the governors of the states to work with him in forming a program covering the following points: (1) a grand plan to solve transcontinental, inter-city, farm-to-market and urban highway problems; (2) a financing proposal based on self-liquidation where possible and on federal help; (3) a cooperative federal-state alliance which would leave administration in local areas; and (4) a federal program, in cooperation with the states, for building an up-to-date interstate system. The biggest problem the program poses is, of course, financing. State highway budgets are now at a record high; the federal government has just doubled its aid funds; and toll road authorities are already engaged in new undertakings reportedly totaling $1.5 billion. The Bureau of Public Roads is currently studying the highway finance problem, including toll road financing, and is expected to present its report by February 1, 1955. Studies are also being made by other federal and state officials and agencies.

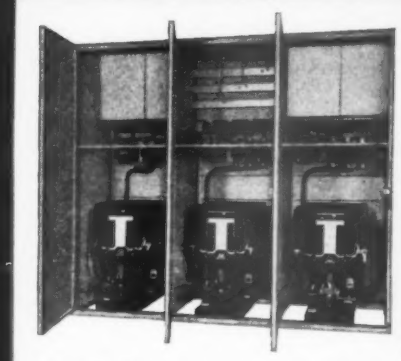
A new silicone water-repellent for masonry has been announced by General Electric Co.'s silicone products division. The product, a transparent silicone resin called "Dri-Film 103 Water Repellent," is reputed to be capable of more effective performance on common brick than any previous material. It can be applied by either brush or spray and, according to the company, prolongs the useful life of masonry, enhances its beauty, and cuts maintenance costs. Common brick treated with the product reportedly will absorb only 0.01 percent moisture after being submerged in water for a week. The results, as claimed, are fewer cracks in exterior surfaces, less peeling and flaking of interior walls, and almost complete elimination of white or yellowish marks commonly resulting from water mingling with the salts in brick and mortar. A gallon of diluted material is said to cover 75 to 100 sq. ft. in one coat on most surfaces.

Two youths were recently arrested in connection with a theft of explosives last March from a midwest stone quarry. Two cases of dynamite and a case, a box and a part of a box of 18-ft. electric exploders, a coil of connecting wires and some fuses were located in the basement of the home of a relative of one of the youths. The explosives were identified as being the kind taken from the quarry. It is believed the youths were using the explosives for dynamiting fish for sale to local markets. The incidence is just another reminder to quarry owners, or others handling explosives, to provide adequate storage facilities and locks.

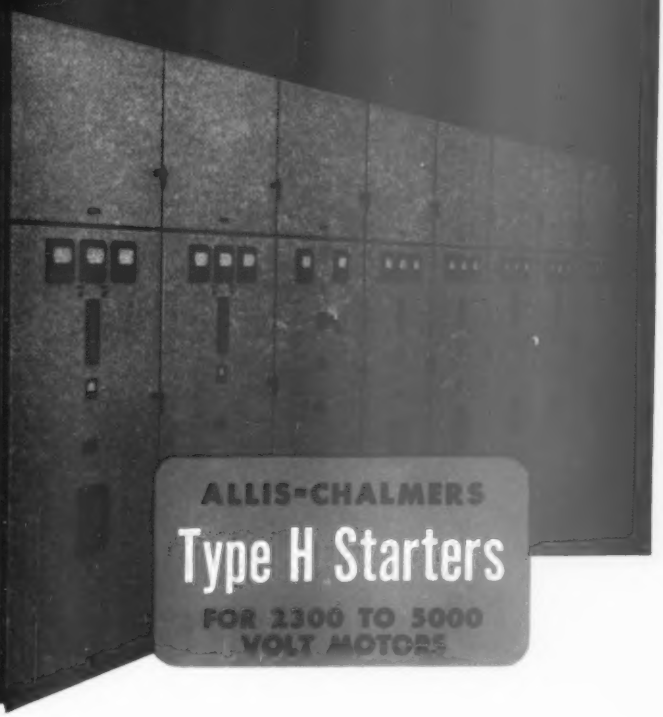
A new abrasives product, developed by Carborundum Co., reportedly may eventually cut down the nation's traffic fatality toll. Called "highway safety grain," the new product is a fused alumina abrasive material of great hardness and is said to make road surfaces more skid-resistant when impregnated with it. A company official stated that scientific tests developed and conducted by Firestone Tire & Rubber Co. "indicate that stopping distance of cars traveling 30 m.p.h. on wet asphalt highways can be reduced one-third by the application of 'highway safety grain.' "

THE EDITORS

"Starting Line-up"



Rear view of HALC Controller Line-up. Bus covers provide maximum protection for personnel and equipment. Starters may be equipped with either oil-immersed or air-break contactors . . . installed in the same space. All components are readily accessible for maintenance.



Easy to Install ▸ Simple to Expand ▸ Attractive in Appearance

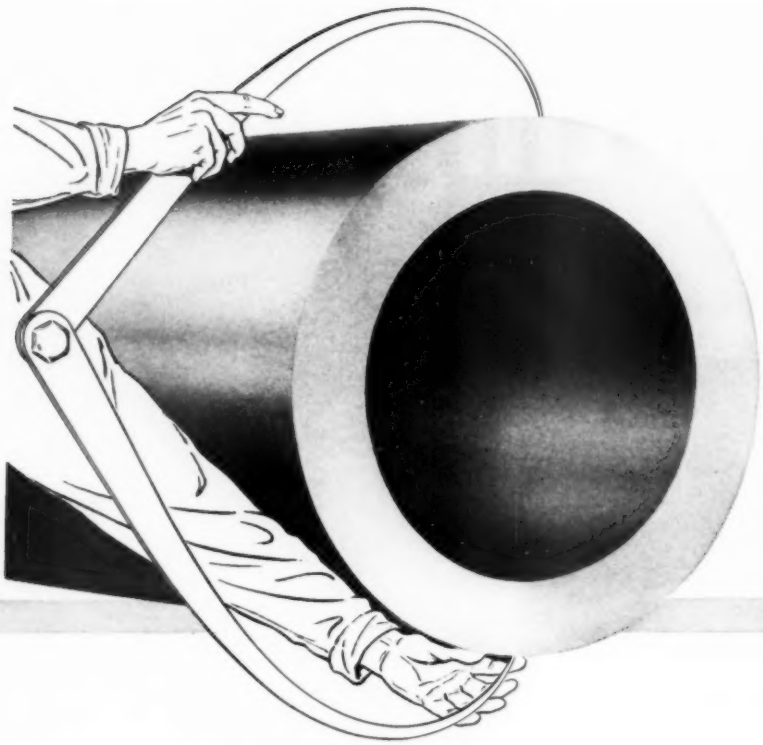
The factory assembled line-up of Type H Starters affords the many advantages of centralized high voltage control for an entire department or plant. One attractive, space-saving group takes the place of many separate cabinets and components. Planning and purchasing are simplified. Installation is quick and easy — only one incoming power feeder required. Internal bus and convenient wiring provisions plus standardization of cubicle size facilitate the addition of starters.

Allis-Chalmers Type H Starters may also be used singly. Each starter is a complete control unit. Contactors, protective devices, meters, relays . . . all the coordinated components necessary for maximum protection of man, motor and machine are engineered into each starter. A-4217

New Bulletin — Type H Starters are built in a wide range of ratings for squirrel-cage, wound-rotor and synchronous motors . . . for full or reduced voltage . . . reversing or non-reversing . . . with plugging, dynamic braking and multi-speed features. New bulletin 14B6410B tells the complete story. See your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS



Designers benefit 5 ways

with B&W Hollow Forgings

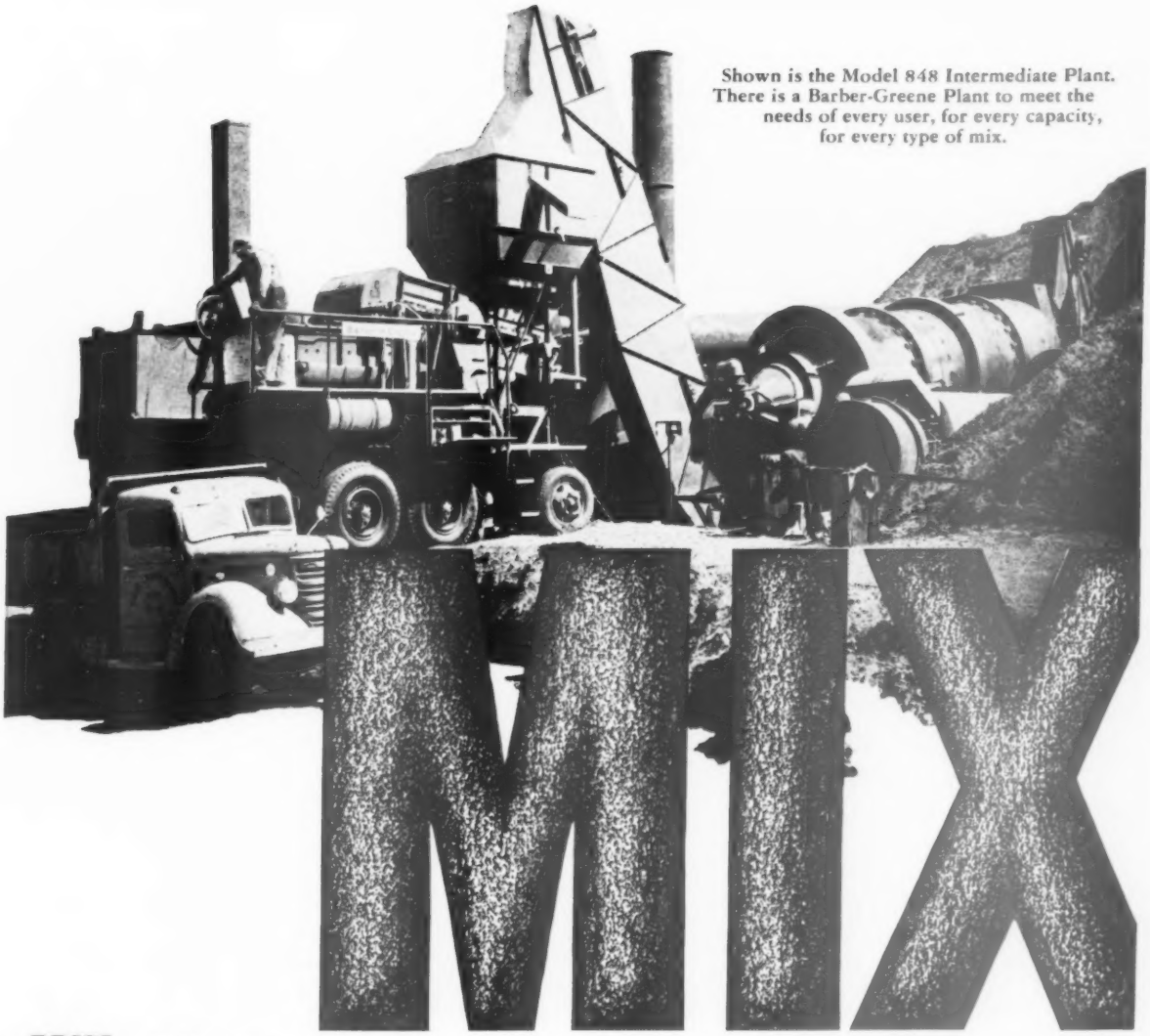
These large-diameter, heavy-wall B&W pipes or tubes offer five specific advantages to the designer interested in better design with savings.

- Single lengths or many lengths can be "tailor-made" to suit specific requirements
- Prompt delivery is assured, even on the smallest orders
- Full forging properties are developed because the metal is thoroughly worked
- Concentricity is excellent
- A wide range of sizes is available

For further details about these forgings and how they may suit your requirements, write for Bulletin S-16.
The Babcock & Wilcox Company,
Process Equipment Department, Barberton, Ohio.

BABCOCK & WILCOX

S-433



Shown is the Model 848 Intermediate Plant. There is a Barber-Greene Plant to meet the needs of every user, for every capacity, for every type of mix.

MIX profitably.

MIX more tonnage per season. **MIX** to meet all specifications.

MIX continuously, with the principle that is inherently automatic.

MIX with mechanically interlocked proportioning for the utmost uniformity.

MIX with the plant that is truly portable.

Let us show you how a Barber-Greene Plant can reduce your costs.

54-39-8

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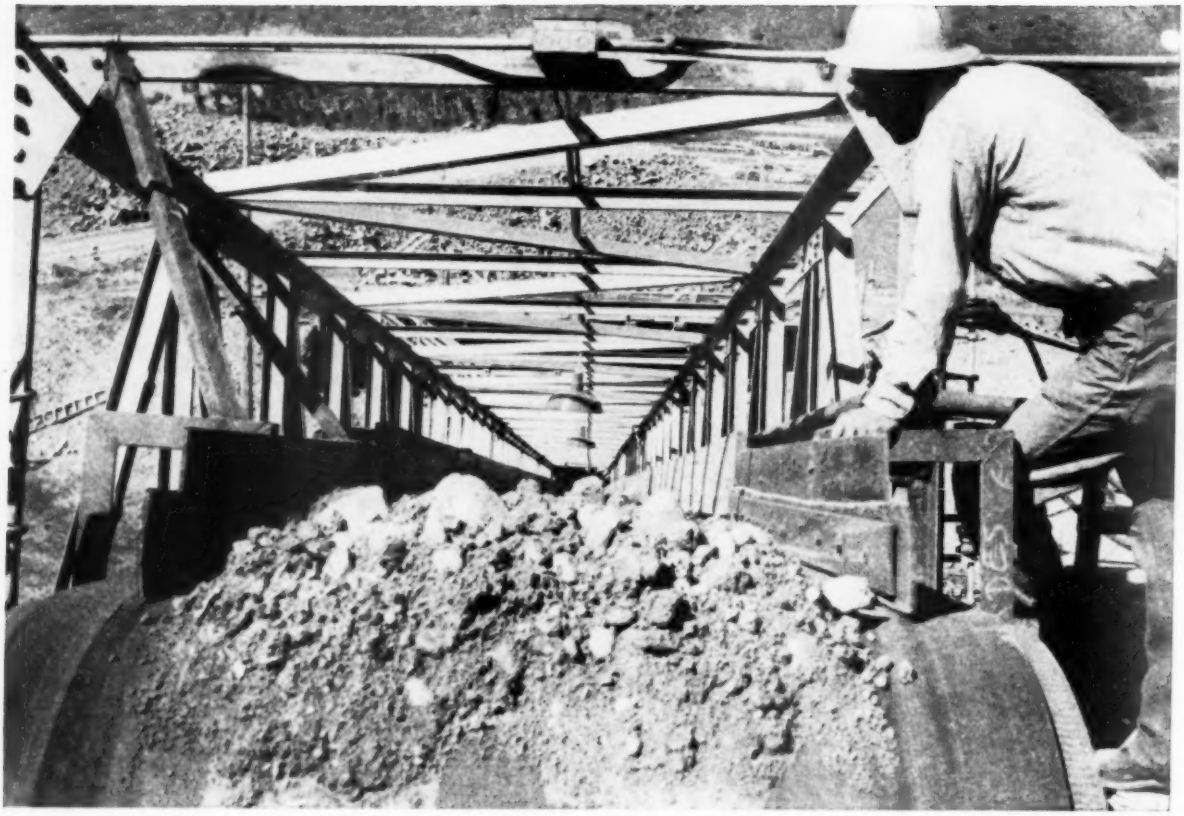

At Palisades Dam . . .

Belt reinforced with Du Pont "Cordura" still in top condition after 14 months' hard service

Reinforced with Du Pont "Cordura," this 45° slope belt hugs the idler for better troughing and training throughout its run.

Palisades Contractors, Palisades, Idaho, put the conveyor belt shown above through rugged 96-hour work weeks for 14 months—and it's still going strong.

The belt, reinforced with Du Pont Cordura* High Tenacity Rayon, carries 530 yards of earth per hour when in steady operation . . . can handle up to 1,800 tons per hour of large and small rocks, some up to 28 inches. Manufactured by Raybestos-Manhattan, Inc., the belt has needed little maintenance since its installation. Du Pont "Cordura" has *extra* strength . . . permits a belt that's thinner yet stronger. And the low stretch of "Cordura" reduces expensive downtime for take-up and resplicing.

Why not consider "Cordura" before ordering your next conveyor belt? Write us for names of suppliers . . . and send for your *free* copy of the new booklet "Mine & Quarry Facts About 'Cordura'." Address: Textile Fibers Department, Room 11506R, E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Delaware.

*REG. U.S. PAT. OFF.

Du Pont "*Cordura*" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

7 pounds, 6 oz.–rarin' to go!

How much weight to a horsepower? Take one of our P&H Diesels — divide its weight by its power — and that's the figure you get.

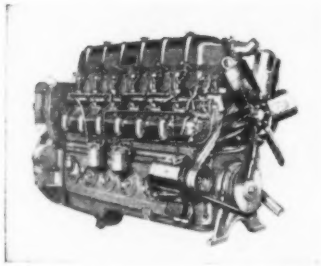
The reason we're so proud of our baby: at 7 pounds, 6 ounces this horse is full grown! No competing diesel can produce a full horsepower to that amount of weight. Pound for pound, this engine out-powers them all.

Dollar for dollar, too. A P&H will give you more horsepower per dollar than any other diesel. And just as a sort of extra, it's also the easiest to service!

Not that it will need much servicing. Actually, a P&H Diesel takes less of it than the old gasoline engine. Its fuel cost: *about one-third.*

Some baby!

P&H Diesel Engine Division, Harnischfeger Corporation, Crystal Lake, Ill.

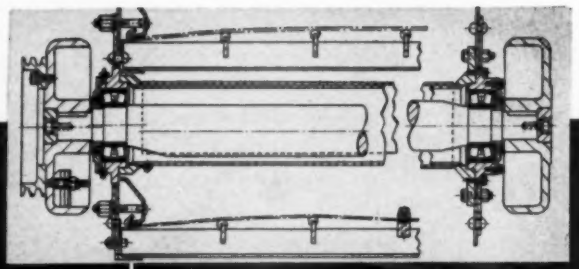


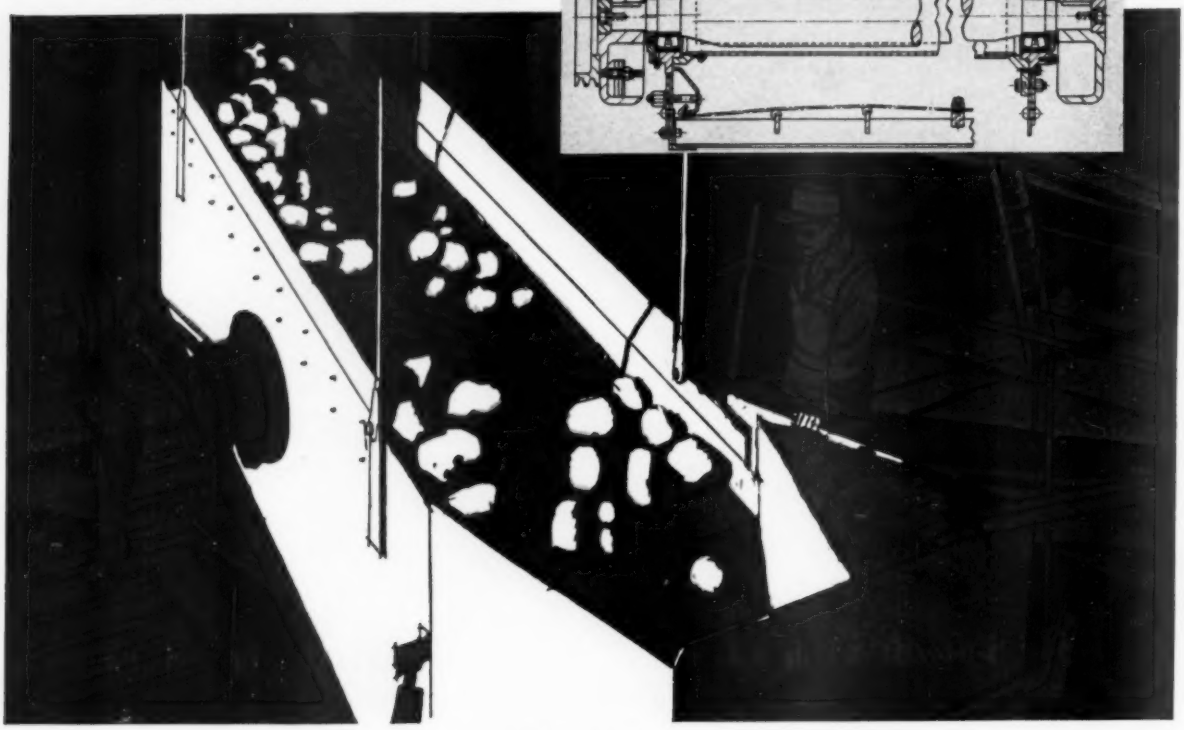
Horsepowers, 30 to 255. Two-cycle, 2, 3, 4, 6-cylinder models. Speeds to 1800 rpm. Stationary, mobile, marine. Diesel-generator sets

THE P&H DIESEL

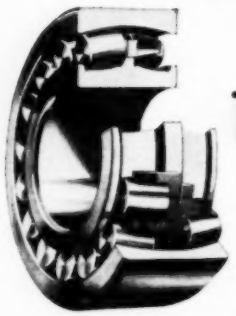
lowest price per horsepower . . .
lowest weight per horsepower

The centrifugal force which produces the perfect circle motion of Ripl-Flo Heavy Duty Vibrating Screens, manufactured by Allis-Chalmers, is imparted through precision-ground, self-aligning TORRINGTON Spherical Roller Bearings.





Solving toughest bearing problems!



Tough bearing problems are encountered in the design of heavy-duty vibrating screens. Leading builders have found the answer in TORRINGTON Spherical Roller Bearings.

Self-aligning, these rugged TORRINGTON Bearings compensate for minimum shaft deflection. Bearing capacity remains constantly at peak value. Bearing wear is greatly reduced.

Precision-ground from heat-treated high-alloy steels, TORRINGTON Spherical Roller Bearings cut friction to a practical minimum. Power flows smoothly and efficiently on high conformity surfaces. Bearing life is lengthened and daily tonnages climb.

Features like these solve the toughest bearing problems not only in vibrating screens but also in pulverizers, grinding mills, crushers and rotary kilns.

Always use TORRINGTON Spherical Roller Bearings!

THE TORRINGTON COMPANY
South Bend 21, Ind. Torrington, Conn.

TORRINGTON SPHERICAL ROLLER BEARINGS

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

22-ton "Eucs" with quarry bodies haul stone for Ideal Cement Co. of Colorado. Top speed of this Model 36 TD, with full payload, is 32.5 m.p.h. Spring mounted drive axle and Allison Torqmatic Drive are important factors in stepping up production and profits at this operation.

Higher Availability
More Tonnage
Lower Costs

On scores of mine and quarry operations all over the world the high job availability of Euclid equipment results in more tons hauled per shift. Because they're engineered and built for the toughest off-the-highway service, "Eucs" stay on the job longer, with less time out for servicing and repairs.

Dependable low cost hauling has made Euclid the preferred equipment for open pit operations in both the metallic and non-metallic mining fields. If you're interested in cutting your hauling cost for ore, overburden or waste, have your Euclid distributor prepare a production and cost estimate for your operation. There's a good chance he can show you how to haul more tonnage at lower cost.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

Rear-Dump models are available in 10, 15, 22, 34 and 50 ton capacities with engines of 165 to 600 h.p. . . . semi-rigid or spring mounted drive axles . . . standard transmissions or Allison Torqmatic Drives.

EUCLID "THE PIONEER"

Euclid Equipment

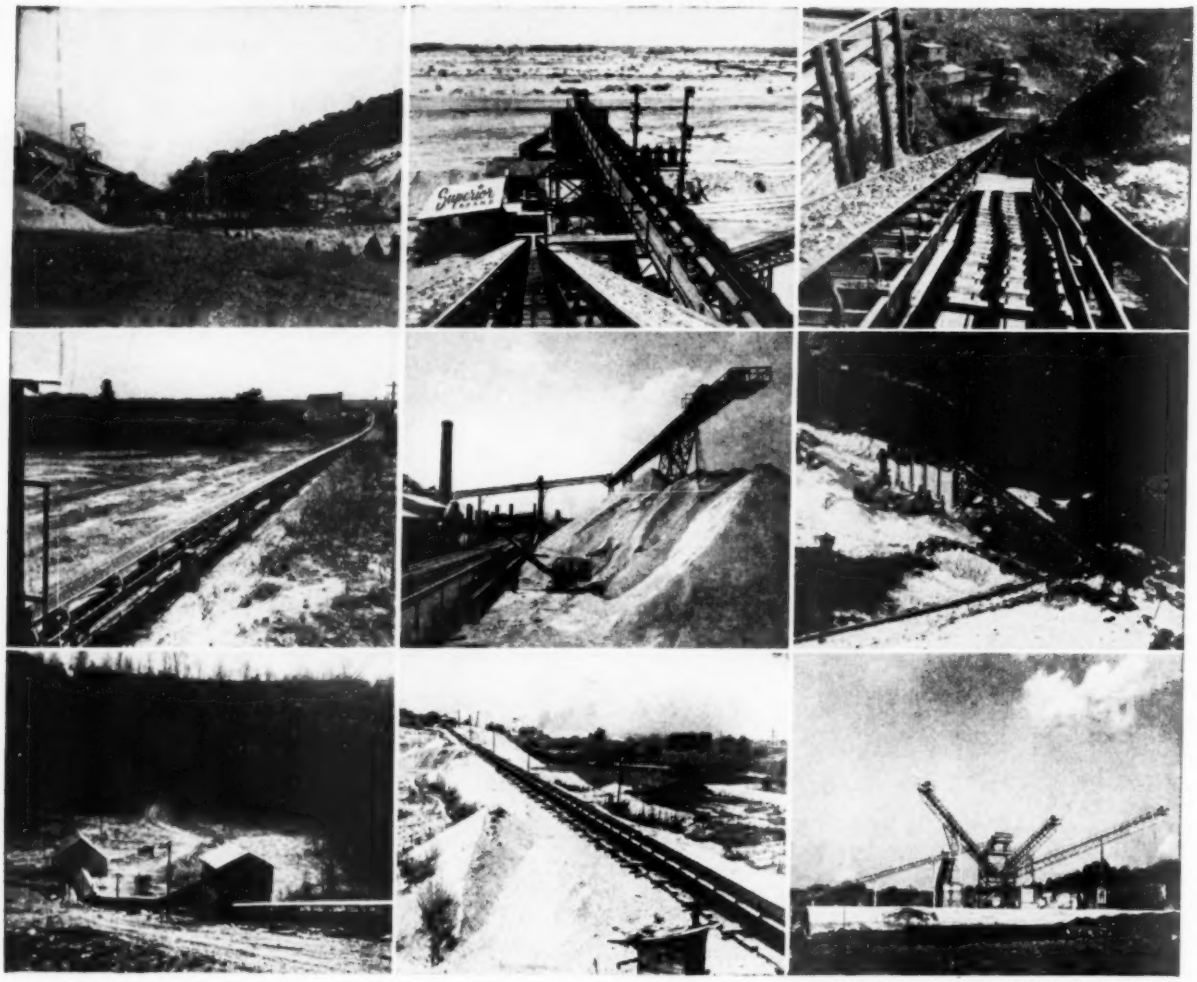
FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

STONE HANDLING!

These are tough jobs—requiring sturdy equipment for long life and uninterrupted service.

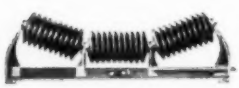
That's why these operators specified *Continental*



HEAVY DUTY IDLER

STANDARD DUTY IDLER

SELF-ALIGNING TROUGHING IDLER



RUBBER DISC IMPACT IDLER

OTHER PRODUCTS: Elevators, Feeders, Screw Conveyors, Pulleys, Trippers, Buckets, Sprockets, Takeups and Bearings.

CG-5002

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CONTINENTAL GIN COMPANY

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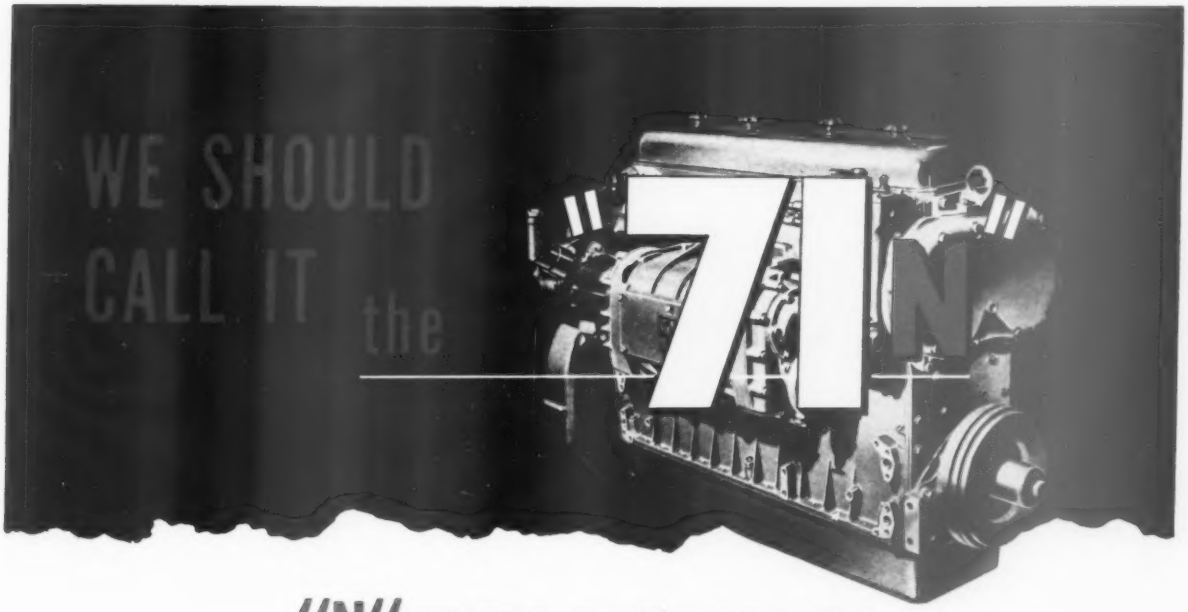

"N" FOR NEW—*New Where It Counts Most*

You don't have to be an old-timer to remember when the first General Motors Series 71 Diesel was introduced. We called it the "71" in 1938 and we call it the "71" today.

But in 17 years these design improvements from top to bottom have given operators higher horsepower, lower fuel consumption and longer engine life. And now, a whole series of new improvements has made this fast-stepping, compact, 2-cycle Diesel better than ever.

NEW **17 TO 1 COMPRESSION** gives better fuel economy, squeezing more power from every gallon of fuel.

NEW **"FIGURE 8" CYLINDER LINERS** give you a cleaner burning, more efficient engine. Air intake area is increased 32% for more complete fuel burning and better exhaust.

NEW **IMPROVEMENTS IN PISTON PIN, PIN RETAINER AND CAM FOLLOWER DESIGN** mean longer life, less maintenance cost. High-valve unit injectors last longer because the valve assembly is away from high cylinder temperature areas. Hard-chrome steel "Lite-Tite" piston rings resist wear; are tougher and more flexible and give many more hours of service.

And—best of all—in your next overhaul you can incorporate any or all of these new improvements in any GM Series 71 Diesel engine you're operating today. "The Inside Story" tells you how these new improvements can help cut your costs and speed your jobs. Mail the coupon today for your copy.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 30 to 300 H.P. • Multiple Units . . . Up to 893 H.P.

It Pays to STANDARDIZE on GM DIESEL POWER

Write For Booklet

DETROIT DIESEL ENGINE DIVISION
General Motors Corporation
Detroit 28, Michigan

Please send me booklet "The Inside Story"

Name:_____
Position:_____
Company:_____
Address:_____
City & State:_____

Barber-Greene Car Unloader
feeding 150 T. P. H.

UNLOAD

UNLOAD the cheapest way.

UNLOAD practically automatically.

UNLOAD a railroad car in less than 45 minutes

UNLOAD virtually all bulk materials with one machine.

UNLOAD with the positive chain-belt drive — no slippage, even when starting under full load.

UNLOAD with the machine above or below the rails.

Model 358 Unloader.
Gasoline or electric. Steel wheels or pneumatic tires. Towing hitch. High discharge height.

Let us show you how the Model 358 can solve your unloading problems.

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AURORA, ILLINOIS, U.S.A.

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cost studies . . . nearby job inspection . . . plant layouts

STURTEVANT MICRONIZER* GRINDING MACHINE

Grinds Materials To Any Micron Size Specification

NOW AVAILABLE FOR OUTRIGHT SALE

24" Size
Capacities 1000 to 1200 lbs. per hour

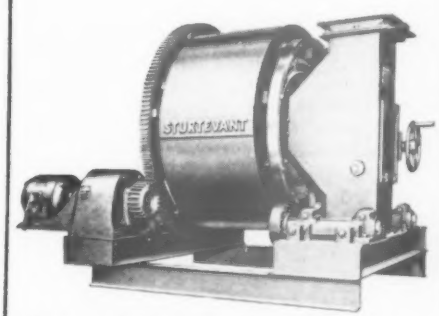
The Sturtevant *Micronizers* are fluid jet grinding machines designed to reduce solid materials to particle sizes in the micron range.

Using compressible fluids, air or steam, as the source of energy, *Micronizers* produce pulverized materials to specifications unobtainable by other mechanical equipment such as ball, pebble or hammer mills.

The variety of materials processed is large and includes both nonmetallic and metallic minerals and ores, metals, pigments, insecticides, fungicides, pharmaceuticals, plastics, dyes and numerous other organic and inorganic products.

It is quickly and easily cleaned on changes of formulation with minimum loss of material. Simple to install and operate. It is available as a machine alone . . . or as a complete grouping with premixing, grinding and bagging equipment. Write for complete information, today.

*Micronizer is the Registered Trademark of the Sturtevant Mill Company.



Sturtevant Dry-Batch Mixer for mixing materials into a homogeneous mass. 5 models: ¼ to 2 tons.

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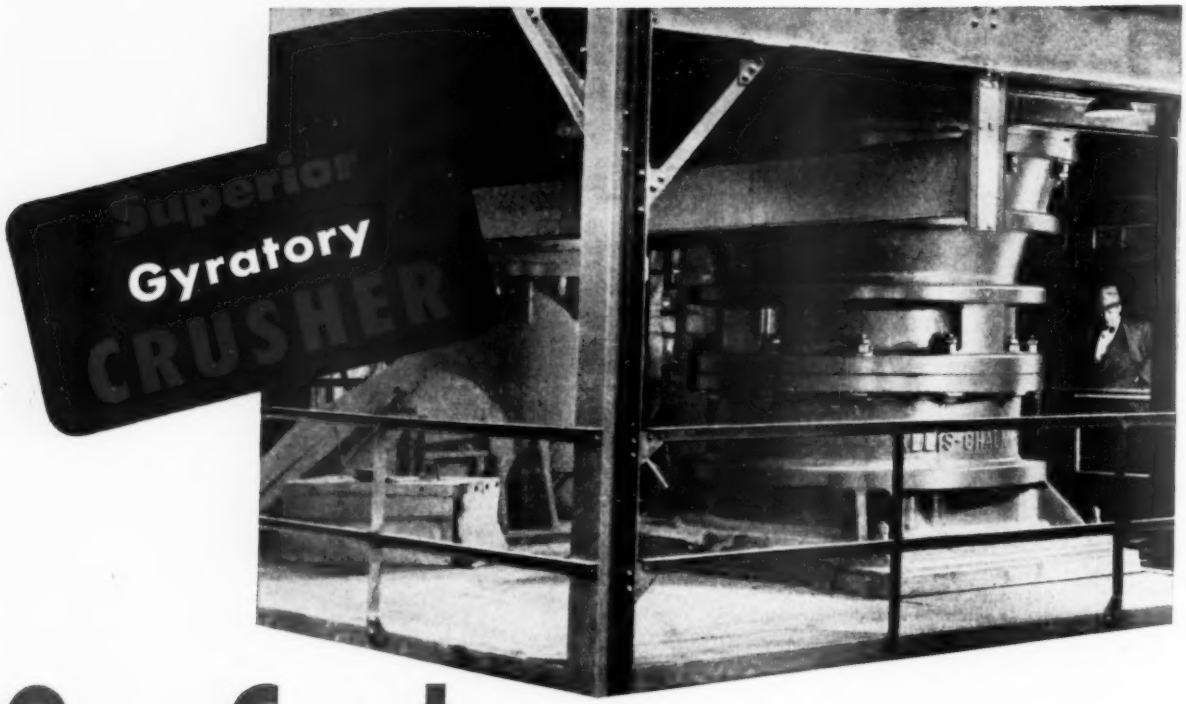

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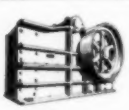
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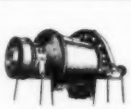
Gyratory Crushers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Many benefits to business in new tax law

THE INTERNAL REVENUE CODE of 1954 will disappoint many businessmen who had hoped for more tax relief to come out of the first complete rewriting of the federal tax laws in many years. However, even though the present fifty-two percent rate on ordinary income in excess of $25,000 has been extended to April 1, 1955, tax relief can be substantial and important to many in business. A careful and detailed reading of the new provisions will reveal that there is unquestionably a trend to giving businessmen a break and therein lies the hope for better future conditions.

Not all of the changes are calculated to reduce taxes by any means, for many tax loopholes have been plugged, and compliance with the rules has been stiffened as well as eased in some respects.

Throughout the rules, it is obvious that they were designed to aid business, and particularly to encourage initiative and growth of small businesses in order that they may flourish. Adjustments to remove inequities have been accomplished, the laws have been clarified and simplified, and the bookkeeping problem will be easier.

Incentives to Growth

The small businessman now has the incentive to perform research and development in order to create new uses for his products. He can now deduct currently the cost of conducting research or amortize the cost over a five-year period or more. In the past, the law was very uncertain on this point and a businessman could only deduct currently what would be considered ordinary and necessary expenditures for the purpose. That was alright for large corporations which have for years provided a budget for research and development as a normal business expense. Now, the tax laws offer an incentive for new companies and smaller corporations to launch a research program.

Faster write-off of investments as provided for in the new regulations, and applicable after December 31, 1954, assures a company that wants to modernize its operations that it will be able to get back in tax-free income a large part of the investment in a shorter time. The new declining-balance method of computing depreciation and other alternative procedures now permissible allow getting back in tax-free income about two-thirds of the cost of a facility during the first one-half of its useful life.

Instead of depreciating capital investment by the old straight-line method to spread deductions over the useful life of a facility, a company may elect to apply double the normal depreciation rate each year to the declining balance. Later, in the depreciation period it may elect to change to the straight-line method in order to gain complete depreciation of the investment.

This permits taking depreciation deductions at rates that more nearly approach the speed at which properties actually suffer obsolescense and wear. Faster depreciation will reduce the risk on investments in machinery and permit faster-growing depreciation reserves for investment in new facilities. This is particularly of benefit to small businesses which usually have the greatest need to improve the efficiency of their operations.

Penalty Taxes—Losses

There always have been marked differences in tax liability, depending on whether a business be run as a partnership or a corporation, and much of the confusion has now been clarified by specific rules. Under some circumstances, a small business may even be given the option to be taxed either as a partnership or a corporation. This could result in eliminating the double taxation of distributed earnings which is a penalty on corporations and could give the right to some partnerships to plough back earnings subject to flat corporate tax rates.

Penalty taxes on retained earnings have been eased which will benefit closely-held corporations that can only raise funds from retained profits for capital investment. These taxes have had the effect in the past of forcing companies to pay out as dividends funds that have really been needed for future expansion. Funds retained for the purpose, up to $60,000, will not be challenged and, in the case of larger retained profits, the burden of proof as to their being legitimate is now on the government.

Still another benefit, of importance particularly to small concerns, is that a loss for any year can now be carried back against the profits of the two preceding years instead of one. Thus, a refund in taxes for two good business years is now possible which is obviously important should business take a downward turn.

Among other benefits are a general upward trend in percentage depletion allowances and permission to group certain separate minerals interests as a single property for the purpose of computing gross income from a property, and more specific treatment governing changes in capitalization.

It isn't likely that corporate income tax rates will soon be markedly reduced, but the new tax law still has many advantages for business.

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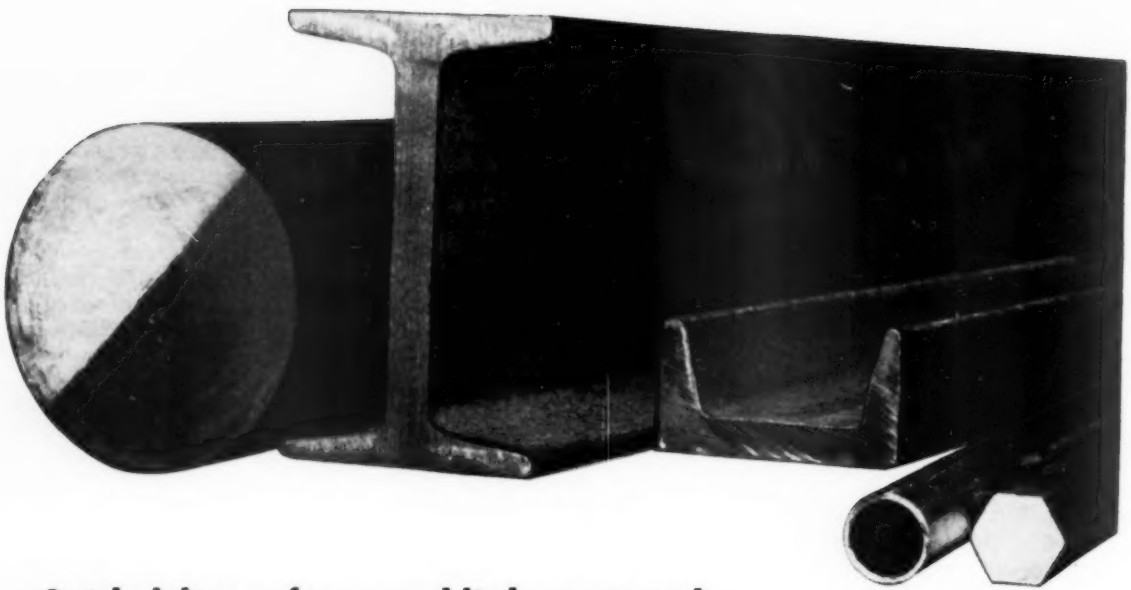

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The chemistry of glass

ROCKY'S NOTES

NATHAN C. ROCKWOOD

PRESUMABLY BECAUSE our interest in the silicates has been self evident, we have been favored with a review copy of "The Properties of Glass,"* by Theodore W. Morey, Geophysical Laboratory, Carnegie Institution of Washington, D. C. While glass technology is somewhat out of our line, we have found much of the text interesting and helpful in understanding the physical chemistry of the silicates, and we believe many of our readers will too. Moreover, a very considerable number of our readers are in the business of supplying the raw materials for glass manufacture. In this day of modern business a raw material supplier can not know too much about the customer uses of his products, so silica, lime and limestone producers probably can find genuinely useful reading in this book.

The text, of course, refers to various commercial glasses and their special properties, but glass is also an incidental ingredient of most portland cement clinkers, so it is not beyond the range of possibility that something may be learned about the properties of such glass from these studies of commercial glass. The common constituents of commercial glass are silica, soda and lime. The varying proportions of these are what give ordinary kinds of glass their special properties. The glass in portland cement clinker, of course, contains a much higher percentage of lime and a much smaller percentage of soda than commercial glass, but the effect of high limed commercial glass has been thoroughly investigated, and it would seem quite possible that from these investigations some clue may exist as to the role of lime in cement-clinker glass. Anyhow, glass manufacture is probably the oldest art in the whole silicate field, omitting clay brick and pot manufacture which dealt originally only with one natural raw material. To make glass required mixtures of two or more raw materials, and of learning ways to melt them and handle the viscous product.

History of Glass

There are natural glasses, which in recent years our industries have begun to utilize for lightweight aggregates, pozzolans, etc. They are molten rock which on being extruded from the interior of the Earth's crust, were suddenly cooled or frozen before the ions of silicon and oxygen had an opportunity to form regular crystals. They frequently contain water vapor or other gas, so that on moderate heating they become bloated and hence form the lightweight aggregates all are familiar with. The commonest of these natural glasses is obsidian, and some West Coast producers have built up an important industry converting obsidian into lightweight concrete aggregates and concrete building units. It was probably through finding and handshaping pieces of obsidian that primitive peoples first became familiar with glass. The Stone Age peoples made arrow heads, cutting tools and articles of personal adornment from obsidian by chipping into various shapes.

Like the first making of lime, the beginning of glass manufacture is believed to have started from the accidental discovery of the result of fire on the ingredients which go to make glass. The earliest records show that the Egyptians knew how to make glass long before the Christian era, and a piece of this glass dating from 1551-1527 B.C. exists in a museum at Oxford, England. During the times of the Roman Empire glass manufacture was an established industry. They had learned to blow glass and to shape various household utensils, such as tableware, bottles, vases, etc. The effect of some metals and metal oxides in giving colors was known. Glass has remained to this day an excellent medium for the skillful and artistic workman in Europe and other foreign countries, but modern American glass manufacture is now "dominated by continuous machine production, precisely controlled by the application of scientific methods."

Devitrification of Glass

The chapter on devitrification of glass, it seems to us, should throw light on the chemistry of all silicates. Glass is glass because it is an undercooled liquid, which on cooling becomes so viscous or sticky that the silica tetrahedra which form the lattice do not have freedom or time enough to arrange themselves in a geometrical pattern to form true crystals. Hence, it is sometimes described as amorphous. At a certain temperature, however, below the melting point, the silica tetrahedra, or the silicon and oxygen ions comprising the tetrahedra, become sufficiently mobile to rearrange themselves into regular lattices to form crystals, and the glass then loses its properties as an undercooled liquid and becomes "devitrified"—that is disintegrated so far as being a fairly homogeneous material is concerned. Heating to a higher temperature again melts the crystals and liquid glass is formed.

As in portland cement manufacture, Gibbs' phase rule applies, and use is made of phase diagrams of two-component and three-component systems involving primarily $Na_2O \cdot SiO_2$, $K_2O \cdot SiO_2$, and $CaO \cdot SiO_2$. As in portland cement manufacture, the ingredients are never pure, which introduces MgO and other oxides, so while the phase rule is equally hard to apply to more than three components, the observed effects of various metal oxides are well known. Also, as in the case of portland cement clinker, commercial glasses, according to our author, are rarely truly homogeneous — in other words, one particle may not have identically the same chemical analysis as the next. He says: "Gross inhomogeneity in a commercial glass will often result in trouble from devitrification when a homogeneous glass of the same general composition would be satisfactory." Probably the same could be said of portland cement.

Composition of Glass

As in other silicates soda is the most effective flux for silica. A high soda glass is readily dissolved in water (the soluable alkali silicates of industry), and other oxides are added to provide stability. Lime is added for this purpose, but, our author says: "too much lime results in a glass hard to melt and sure to devitrify." Also, it is stated: "Alumina in small quantity gives greater chemical durability, lower coefficient of expansion and greater freedom from expansion." The inclusion of a small proportion of potash is said to be beneficial in increasing the chemical durability and in diminishing the tendency toward devitrification but requires a higher melting temperature. Ordinary soda-lime-silica glass has a

(Continued on page 116)

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LABOR RELATIONS TRENDS

By NATHAN C. ROCKWOOD

More Conservative Attitude of N.L.R.B. Becoming Evident

EVERYONE WHO READS the newspaper probably has seen extracts from some of the Labor Day speeches of labor-union bosses condemning the present national administration as hostile to labor. To an unbiased observer who follows, and has followed for many years, the trends in labor relations developments, it would appear that we have at last arrived at a fair and equitable administration of laws that are primarily designed to protect labor and the public from exploitation by union bosses, quite as much as by unconscientious employers. These changes have come in the attitude and decisions of the National Labor Relations Board as a result of a new majority of three conservative and judicially-minded citizens, where the minority of two survivors of the old board still cling in many instances to left-wing points of view. At one time the opinions and actions of the Board, it is now known, were actually directed or governed by communists or communist sympathizers, which labor union bosses liked, even though they profess to abhor communism.

New Rules

The interpretation of the Taft-Hartley Act and of the Wagner Act, which preceded it, has always been chiefly a matter for the National Labor Relations Board to decide on its own, in the absence of U. S. Court decisions, which might indicate broad patterns of policy. The old Board often appeared to ignore unfavorable decisions and to pursue its prolabor course regardless. That has now been changed, court decisions have been reviewed, and the Congressional intent of the laws studied, so that the aim of the present Board is an impartial administration of these laws, which could have been helpful in establishing better relations between labor and industry from the very start.

Under new or changed rules governing Board procedure are the following: The Board has made it difficult or impossible for labor unions whose officers have filed false noncommunist affidavits to get access to the Board. This is in line with a new Act of Congress which deprives unions found to be communist infiltrated, or are communist fronts, or are communist action groups, any rights under the Taft-Hartley Act (Labor-Management Relations Act). A Subversive Activities Control Board is set up to determine whether or not a union falls in one or the other of these categories. The right of an employer, when there is no evidence that he is attempting to undermine or bypass a union, has been approved to reject recognition of a union pending a formal N.L.R.B. election.

A third policy adopted is to apply a theory of constructive participation which will impose a strict standard of responsibility on the part of union members for unlawful acts by the union. A recent court decision, however, makes the local union, not the national with which it is affiliated, responsible for such acts when the contract is actually signed by local and not national union officers. The Board now recognizes the right of employers to talk to so-called "captive audiences," provided the union be given an equal opportunity to reply to the employer's arguments, but only where the employer enforces a broad no-solicitation rule. The Board has established a new rule on conducting elections which forbids any speech-making to employes on working time within 24 hours before a N.L.R.B. election; a violation of this rule will invalidate the election.

Under a new policy rule a union contract giving the union authority to settle controversies over seniorities is now considered a violation of the law. We have published in these columns during the past year examples of union abuse of this authority to punish a member for delay in paying his dues. The Board has revised its rules for granting elections to bargaining units of skilled workmen within a plant unit, so that they may not necessarily be lumped with the entire labor force. Also, added to the list of "unprotected" strikes is the so-called "hit-and-run" tactics used against a West Coast telephone company. It joins the sit-down strike as no longer a legitimate economic force to be applied by labor unions to employers.

The Board has established a new policy for dealing with what has been termed "union schism," where a local union wishes to disaffiliate with a national union. A new election is now permissible under certain conditions. A union must now conduct its bargaining in a business-like manner, for under a new policy rule it is held that a union violated its bargaining duties under the Act by engaging in a series of harassing tactics to force the employer's hand. A great many small employer controversies have been sidestepped, in order to concentrate the work of the Board on larger matters and more important issues. Such cases, and we presume that will include many of those arising in our rock products industries, will revert to state authorities. In many of these states "right-to-work" laws are administered, and labor-union bosses are very much perturbed at the prospect.

Group Employer Contracts

Perhaps one of the most important new rules is that regarding strikes against one of an employer group or association working under a single joint contract, or separate uniform contracts of the same standards. This is a type of contract used by concrete aggregate and ready-mixed concrete producers in some of our large metropolitan areas. The subject was thoroughly discussed at last winter's conventions of the National Sand and Gravel and National Ready-Mixed Concrete Associations, reported in the March issue of ROCK PRODUCTS and commented on in Rocky's Notes, July issue. The Board reversed a ruling of the old Board which was inclined to view all such lockouts as illegal and now holds that it is legal for an employer to invoke a temporary lockout where a union calls a strike against any one member of the employer group in hopes of finding a weak sister, later to use this case as a lever or a blackjack on the other members of the group. Further on in this report we shall cite the specific N.L.R.B. decision upon which this new rule is based.

Under another revision of a long-standing rule, the Board now holds that an employer may legitimately question his employes about union membership and activities so long as he sticks to questions to develop information and does not use illegal methods to influence the employes. Under the old rules an employer dare not even question any employe about unions. The Board has modified its previous interpretation of the section of the Act which requires 60-days' notice of intention to modify or terminate a union bargaining contract. The new rule bars strikes or lockouts during that period, or until the expira-

(Continued on page 150)

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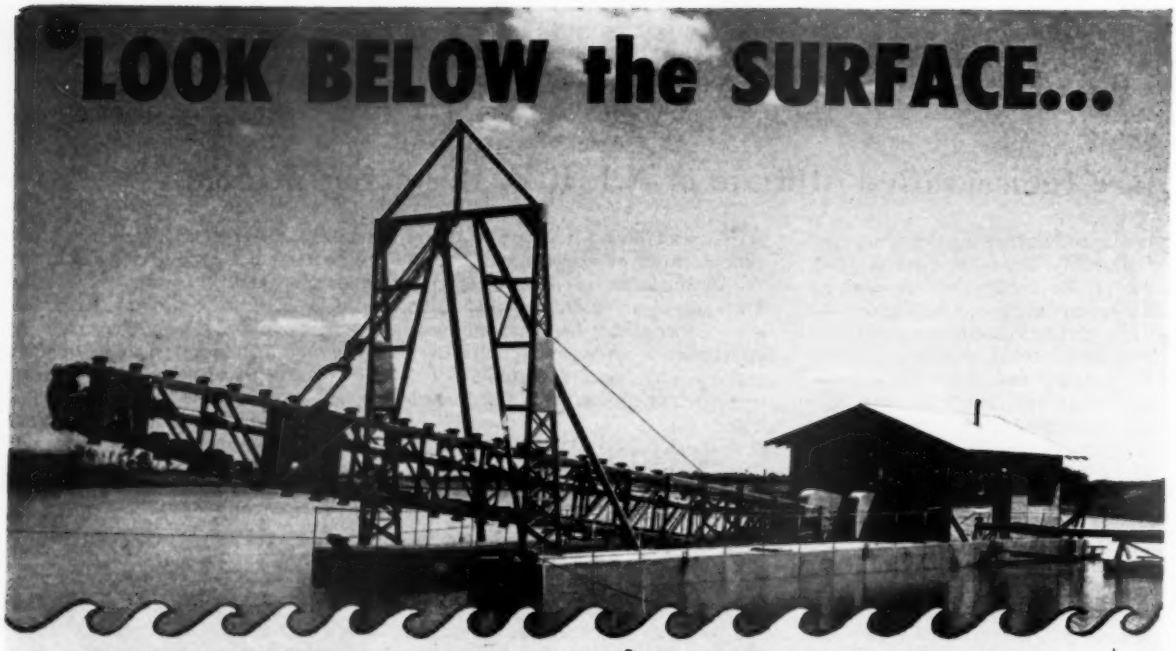

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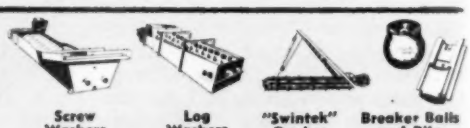

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PEOPLE

IN THE NEWS

Sales Managers

JOHN M. JUNKIN has been named general manager of sales of the lime and stone division of Warner Co., Philadelphia, Penn. He was formerly district sales manager of the Pittsburgh office of the division and will be succeeded by Glenn L. Guy. Paul L. Bock, special sales representative, has been appointed sales manager of the Cedar Hollow division, where he will be in charge of all sales of dolomitic lime and stone products manufactured at that plant.

Mr. Junkin joined the Bellefonte plant in 1937 as a lime salesman. In 1941, he was appointed district sales manager as Pittsburgh. A graduate of Amherst College, Amherst, Mass., he formerly served in the sales department of United States Gypsum Co.

Mr. Bock, a member of the Quarter Century Club, has worked with the Cedar Hollow laboratory and sales department on research and development of new products and new uses for standard materials.

Mr. Guy was formerly vice-president and general manager of Knox, Strouss & Bragdon Co.

Vice-President Retires

RALPH E. ROSCOE has retired as vice-president of The Bessemer Limestone and Cement Co., Youngstown, Ohio, but will continue to serve as a director. A native of Michigan, where he received his early education and college training, Mr. Roscoe has served the cement industry for 48 years, 25 of which were spent with Bessemer Limestone and Cement Co. He started his career as a cement chemist in 1906 and served continuously with cement companies, among them being the Elk Cement and Lime Co., Elk Rapids, Mich.; Imperial Cement Co., Owen Sound, Ont., Canada; Newaygo Portland Cement Co., Newago, Mich.; Virginia Portland Cement Co., Fordwick, Va.; Lehigh Portland Cement Co., Allentown, Penn.; Phoenix Portland Cement Co., Birmingham, Ala.; Alpha Portland Cement Co., Birmingham, Ala.; Missouri Portland Cement Co., St. Louis, Mo., and The Bessemer Limestone and Cement Co.

Mr. Roscoe is also a director of the Industrial Silica Corp., Youngstown, Ohio. He has been a member of the

Ralph E. Roscoe

American Society for Testing Materials since 1913 and is an honorary member of Committee C-1 on Cement. He has been active on technical committees of the Portland Cement Association and the American Concrete Institute. Mr. Roscoe plans to spend considerable time traveling, fishing and boating in Florida, where he will reside for about six months each year, and also keep his home in Youngstown, Ohio.

Secretary and Attorney

EDWARD D. DEPEW, assistant secretary of Universal Atlas Cement Co., New York, N. Y. has been elected secretary and appointed general attorney. A native of Jersey City, N. J., Mr. Depew was graduated from Wesleyen University, Middletown, Conn., receiving his B.A. degree in 1937. He received his LL.B. degree from New York University School of Law in 1942, and was admitted to the New York Bar in 1946, after active duty in the Army Air Force. He joined Universal Atlas in 1947 as attorney specializing in labor matters and in 1951 was appointed assistant secretary.

Manager Retires

GEORGE T. HARLEY has retired as manager of the Carlsbad, N. M., potash mines of International Minerals and Chemical Corp., Chicago, Ill. He will be succeeded by Carl Arend who has been managing the operations since January of this year, during which time Mr. Harley has served as special consultant and advisor. Mr. Harley joined International as a geologist in 1940 and became manager of the potash mining operations in 1944. He has had wide experience in the fields of mining and geology. He holds four college degrees in mining and petroleum geology, mining engineering and business administration from the University of Colorado, New Mexico School of Mines and Columbia University. Mr. Harley plans to engage in private practice as a geological and mining consultant.

Association President

CARL F. SHOAFF, vice-president and general manager of the J. P. Loomis Concrete and Supply Co., Akron, Ohio, has been elected president of The Ohio Ready Mixed Concrete Association. He succeeds J. A. Nicholson, president of Nicholson Concrete Co., Toledo, Ohio. Mr. Shoaff has served as vice-president of the Association for the past year.

Elected Chairman

MARJORIE HOLLINGSWORTH, assistant secretary of the Consolidated Quarries Corp., Lithonia, Ga., has been elected chairman of the Gem Section of the Georgia Mineral Society. Nelson Severinghaus, vice-president and general manager, is a past president of the Society and also a past chairman of the Gem Section.

Marjorie Hollingsworth

Sales Manager

WILLIAM JEFFREY, formerly manager of the Stockton Building Materials Co., has been appointed manager of dealer sales for Calaveras Cement Co., San Francisco, Calif. He will supervise field activities in San Francisco, Fresno, Modesto, Stockton, Sacramento, Chico, Oakland and Santa Rosa. Merle Segale, sales representative in Stockton, has been appointed contractor sales representative in the territory from Lodi south to Bakersfield, with headquarters in Stockton. Tom Love, Jr., assistant chemist in the San Andreas plant, has been transferred to Stockton as dealer sales representative. Jack Gordon has been named contractor sales representative in Alameda and Contra Costa counties, and Lowell Garrett will handle the territory from Sacramento north to the Oregon border.

District Engineers

MERRITT R. ROYER has been appointed district engineer for the Arkansas, eastern Kansas, Missouri and eastern Nebraska territory of The Asphalt Institute, New York, N. Y., with headquarters in Kansas City, Mo. Raleigh W. Gamble has been named district engineer for the states of Illinois and Wisconsin, with headquarters in Chicago, Ill. Mr. Royer was formerly with the Kansas State Highway Commission and Mr. Gamble, prior to joining the Asphalt Institute, was superintendent of the Bureau of Street Construction and Repairs of the City of Milwaukee.

Committee Chairman

FRANK E. MCCASLIN, president of the Oregon Portland Cement Co., Portland, Ore., and a member of the board of directors of the Chamber of Commerce of the United States, has been appointed chairman of the Committee on Natural Resources for the second year. Ralph L. Dickey, president, The Kelley Island Lime and Transport Co., Cleveland, Ohio, has been appointed a member of the committee representing the minerals and metals industries.

Named Vice-President

PETER ANDERSON has been appointed vice-president and assistant general manager of The Northwestern States Portland Cement Co., Mason City, Iowa. Frank B. Pirkl has been named secretary and Glenn R. Leaman, treasurer.

Public Relations Manager

RICHARD G. KNOX has been appointed manager of the public relations bureau of the Portland Cement Association, Chicago, Ill. He succeeds Joseph N. Bell, who has resigned to devote more time to magazine writing and public relations consultant work. Mr. Knox joined the P.C.A. in 1948 as a staff writer for the public relations bureau and in 1952 was made assistant manager. He is a graduate of Emory University in Georgia and Northwestern University, Evanston, Ill., where he received his B.A. and M.S. degrees in journalism.

Directors Retire

W. AGNEW BLISS, a director of Dravo Corp., Pittsburgh, Penn., has retired after 49 years of continuous service. He joined the company in 1905. In 1927 he was appointed sales manager and assistant to the president of the Keystone Sand and Supply Co., predecessor to the Keystone division. Mr. Bliss became a director of Dravo in 1930 and served until 1949. He also was a vice-president and director of Charleroi Supply Co., a subsidiary In 1953, Mr. Bliss received the honorary degree of Doctor of Laws from Geneva College, Beaver Falls, Penn., and served on the board of trustees for several years.

Vice-presidents and directors Samuel P. Felix, who has been with Dravo for 43 years; Estep T. Gott, who has served 48 years; and J. S. Miller, with a service record of 47 years, have also retired.

Publicity Director

CHARLES E. ROBERTS has been appointed publicity director for the West Virginia district of the Portland Cement Association, Chicago, Ill. A graduate of West Virginia University, Morgantown, W. Va., Mr. Roberts was formerly assistant alumni secretary and an assistant in the Bureau of Information of the University. Previously he worked in the newspaper business, editing papers in Buckhannon, Weston and Clarksburg, W. Va.

Assists Operating Manager

RAY GRAVES, formerly plant engineer at the Waco, Texas, plant of Universal Atlas Cement Co., New York, N. Y., has been appointed assistant to the general operating manager. He joined the Leeds, Ala., plant in 1926 as stores clerk, was transferred to the Waco plant in 1928, and the following year was appointed storekeeper. In 1945 he was made plant engineer.

Chief Engineer

EARL C. SLEEMAN has been appointed chief engineer of the Lith-I-Bar Co., Holland, Mich., where he will be in charge of engineering and development on all products of the company, including the Lith-I-Block machine and Lith-I-Bar concrete joist machine. Mr. Sleeman, who joined Lith-I-Bar as a design engineer in 1952, has had wide experience in the design of heavy industrial equipment as an engineering consultant.

Directs Retail Plant

GILBERT R. FULLER, vice-president in charge of sales of the Portsmouth Sand and Gravel Co., Portsmouth, Ohio, has completed arrangements to operate a retail sand and gravel service in Portsmouth, which he plans to conduct in conjunction with the corrugated pipe business he recently established. The Portsmouth Sand and Gravel Co. recently announced the closing out of its affairs in Portsmouth after being in business for 37 years. For the past two years Mr. Fuller has served as president of the Ohio Sand and Gravel Association.

Sales Manager

R. S. NORRIS has been appointed division sales manager of the New York division of United States Gypsum Co., Chicago, Ill. He was formerly division manager of the Northeast division and will be succeeded in this position by R. H. Marack. R. E. Underwood has been named merchandise manager of the company's New York division.

Officers Re-elected

C. GORDON COCKSHUTT was re-elected chairman of the board of Gypsum, Lime and Alabastine, Canada, Ltd., Paris, Canada, and P. P. Tyler was re-elected president. J. E. McConnell and S. G. Dixon were re-elected vice-presidents.

Assists Sales Manager

ALBERT G. SATTICH has been appointed assistant sales manager of the Louisville Cement Co., Louisville, Ky., in addition to his duties as head of the order and customer-service department.

C. of C. Vice-President

J. E. IRVIN, manager of the Rotan, Texas, plant of National Gypsum Co., Buffalo, N.Y., has been named vice-president of the Rotan Chamber of Commerce.

President and Director

L. S. ODELL has been named vice-chairman of the board, and L. F. Long, president and managing director of Building Products Ltd., Montreal, Canada.

Senior Vice-President

CHARLES S. WHITNEY, Milwaukee, Wis., a partner in the firm of Ammann & Whitney, consulting engineers, has been elected senior vice-president of the American Concrete Institute.

Heads International Concrete Congress

GILBERT E. OLSON, vice-president, Builders Supply Corp., Phoenix, Ariz., was elected president of the First International Congress of Pre-Cast Concrete Manufacturers held in Brussels, Belgium, June 20 to 27. He was elected for a three-year term by the unanimous vote of the 235 delegates attending the Congress, which is the outgrowth of work of the Foreign Operations Administration of the United States and of a visit of Belgian building materials dealers to Phoenix, Ariz., sponsored by the F.O.A. As the Belgian group decided that free Europe needed the training as much as their own country, the Belgian Office for Productivity Promotion, with the European Productivity Board, initiated the conference under the direction of the F.O.A. Mr. Olson, one of three Americans among the 235 delegates from 22 nations, used 2000 ft. of colored film and 400 colored slides which he took in Phoenix housing tracts to show the advantages of standardized sizes for windows, fixtures and doors, and to display local building methods. Mr. Olson, who was accompanied on the trip by his wife, will return to Brussels in January for a plenary session of the Congress and to check on work of the International Information Office which has been established there to provide building data to all nations. He returned to the United States by way of Washington, D. C., to report on the Congress.

On Board of Directors

JOSEPH A. BULLEN, JR., operations manager of Fountain Sand and Gravel Co., Pueblo, Colo., has been elected to the board of directors of the First National Bank of Pueblo.

OBITUARIES

ARTHUR B. MACK, director and executive vice-president of The Kelley Island Lime and Transport Co. (now the Kelley Island Co.), Cleveland, Ohio, died on August 29 following a one-day illness. He was 70 years old and was well known throughout the lime, stone and railroad industries. Born in Joliet, Ill., and after service with the railroad industry in the Chicago area, he went to Marblehead, Ohio, as auditor and general freight agent for the Lakeside and Marblehead Railroad Co., a subsidiary of The Kelley Island Lime and Transport Co., which he joined in 1922 as assistant general manager. When The Kelley Island Lime and Transport Co. became the Kelley Island Co. recently through merger, Mr. Mack continued as executive vice-president and a director. He was also a director of Cleveland Quarries Co.

ARTHUR RUETTGERS, retired head of the Denver laboratories of the Bureau of Reclamation, died in Denver, August 8, after a long illness. Known for his pioneering work in concrete control techniques, Mr. Ruettgers was born in Newark, N. J., and received his B.S. degree in civil engineering from Allegheney College, Meadville, Penn., in 1912, and his M.S. degree in civil engineering from the University of Michigan, Ann Arbor, Mich., in 1915. His first work with the Bureau was on the Sun River Project in Montana in 1915, and included work on the Riverton Project in Wyoming, the Yakima Project in Washington and 25 years in the Denver office of the Bureau. In 1927 he inaugurated the Bureau's use of modern concrete control techniques and was appointed head of the Denver laboratories in 1929. During this period he directed preparation of the first three editions of the Bureau's *Concrete Manual*, an authoritative handbook of information and instruction on concrete control and construction technique. From 1942 until his retirement he directed preparation of the Bureau's *Treatise on Dams* and *Boulder Canyon Project Final Reports*. Mr. Ruettgers was a member of the American Concrete Institute and the American Society of Civil Engineers.

RODERICK B. YOUNG, formerly associate director of research of the Ontario Hydro-Electric Commission and an authority on concrete, died August 24 in Toronto, Ontario, Canada. He had been associated with the commission for 41 years. Mr. Young had received numerous awards for his work in studying and improving concrete techniques. In 1928 he won the Thomas Fitch Rowland prize of the American Society of Civil Engineers. In 1937 he received the Wason Medal of the American Concrete Institute, of which he was made an honorary member in 1953. He also received the Award of Merit of the American Society for Testing Materials in 1953. Mr. Young was a member of the Association of Professional Engineers of Ontario and the Engineering Institute of Canada.

HERBERT L. WHITTEMORE, retired chief of the engineering mechanics section of the National Bureau of Standards, Washington, D. C., died recently at the age of 77. Mr. Whittemore, who was appointed chief of the section in 1917 by President Woodrow Wilson, invented the Whittemore, fulcrum plate strain gauge for measuring stress in concrete dams and large steel structures. Born in Milwaukee, Wis., he studied at the University of Wisconsin. He taught mechanics at the University of Illinois and Columbia University, and later was appointed a professor at the University of Oklahoma. He was author of numerous papers and books and the recipient of many honors from professional societies of which he was a member.

HARRY J. MCMULLEN, superintendent of the Mapleton, Ohio, plant of the Pennsylvania Glass Sand Corp., Lewiston, Penn., was fatally injured when he was struck on the head by flying rock during a blasting operation at the quarry. He was 52 years old. James Offutt, Berkeley Springs, W. Va., an engineer with Pennsylvania Glass Sand Co., suffered a fractured left leg. Both Mr. McMullen and Mr. Offutt were among a group of company officials witnessing the operation. Both were hit as they raced for cover behind a stone ledge.

CLARENCE BLAKESLEE, chairman of the board of C. W. Blakeslee & Sons Co., New Haven, Conn., died recently at the age of 91. Mr. Blakeslee was long identified with the New Haven Trap Rock Co., New Haven, Conn., as well as the Blakeslee company. He was a graduate of Sheffield Scientific School and had been associated with the firm organized by his father since 1900.

JOHN D. MORAN, vice-president of the Fischer Lime and Cement Co., Memphis, Tenn., died suddenly on August 8. He was 63 years of age. Mr. Moran started his career with the company 43 years ago as a warehouse helper, subsequently becoming sales manager. He was named vice-president in 1944.

HARRY GARAUX, retired president of the United Sand and Gravel Co., Canton, Ohio, and a founder of the Garaux Brothers Construction Co., died July 26. He was 78 years old. Mr. Garaux, who retired in 1949, started in the construction business with his brother, George, in 1909. They incorporated the Garaux Brothers Construction Co. in 1917.

CARL EDWARD GROBE, general manager of the Grobe & Son Sand & Gravel Co., Poplar Bluff, Mo., died August 6 after an illness of seven months. He was 61 years old. Mr. Grobe started the sand and gravel business 30 years ago, and he and his son, Louis C. Grobe, have been operating the plant for the past several years.

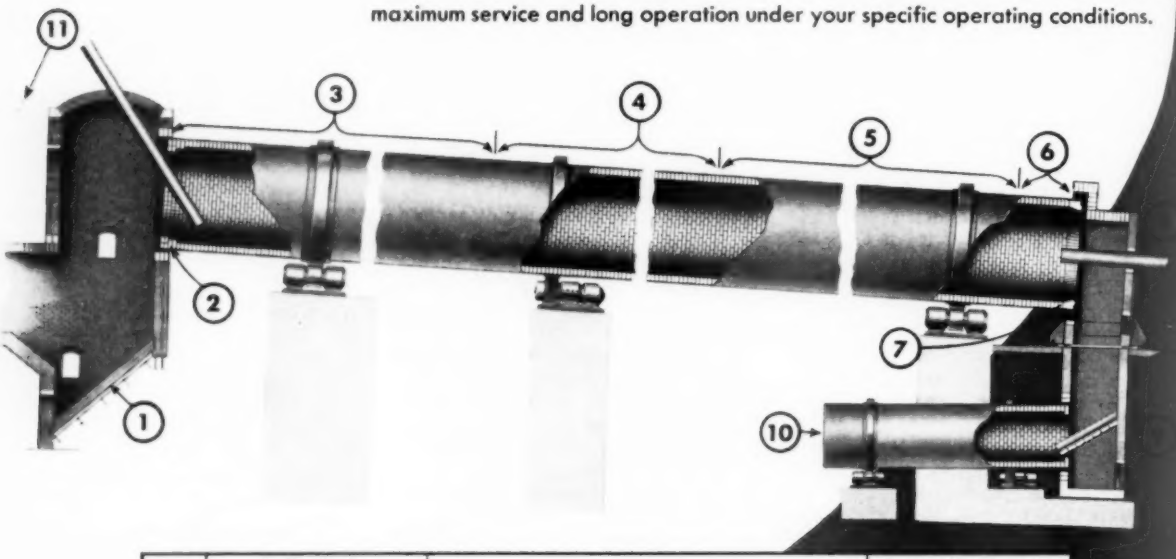
FRANK J. NOBEL, president and one of the founders of the St. Louis County Sand Co., Florissant, Mo., died August 16 at the age of 54.

A. P. Green
REFRACTORY
PRODUCTS

SERVE THE WORLD'S INDUSTRIES

THESE 11 CEMENT KILN AREAS

These recommendations apply to the majority of cement and lime kilns. Where unusual conditions exist, your A. P. Green Representative will work with you to determine the most effective and economical lining to provide maximum service and long operation under your specific operating conditions.



	In This Section Of Your Kiln	You Need	Because You Encounter These Temperatures
1	Dust Collectors	EMPIRE OR OZARK Dry Press brick for moderate duty service.	Up to 1300° F. or 705° C.
2	Feed End or Tail Ring Construction	MEX-KO or EMPIRE for mechanical strength, structural stability and uniformity.	Up to 1400° F. or 760° C.
3	Drying or Preheating Zone	EMPIRE Liners for high strength, uniformity, resistance to abrasion.	Up to 1800° F. or 980° C.
4	Intermediate Zone	A. P. Green HOT ZONE Liners to resist spalling and abrasion.	Up to 2400° F. or 1315° C.
5	Burning Zone	KRUZITE Liners to resist chemical attack, slagging, spalling and abrasion.	Up to 2900° F. or 1595° C.
6	Cooling or Soaking Zone	A. P. Green HOT ZONE Liners to resist abrasion and spalling.	Up to 2500° F. or 1370° C.
7	Discharge or Nose Ring Block	MEX-KO or EMPIRE for mechanical strength, dimensional uniformity and resistance to thermal spalling.	150° F. to 2200° F. or 65° to 1205° C.
8	Kiln Hood	MEX-KO, EMPIRE or castable construction to resist spalling.	Up to 2400° F. or 1315° C.
9	Clinker Chute	EMPIRE to resist abrasion and spalling.	Up to 2200° F. or 1205° C.
10	Cooler	EMPIRE Liners for rotary coolers to resist abrasion and spalling.	Up to 2000° F. or 1095° C.
11	Waste Heat Boiler (not shown above)	EMPIRE or OZARK Dry Press brick for moderate duty service.	Up to 1200° F. or 650° C.

INDUSTRY NEWS

Opens Cement Distribution Plant

PERMANENTE CEMENT CO., Oakland, Calif., recently opened its East Pasco, Wash., cement distribution plant. A large representation of public officials and members of the construction industries from the Tri-City area attended the dedication ceremonies which were presided over by E. H. Kendall, Pacific Northwest district sales manager for Permanente.

The East Pasco plant, situated at the Tidewater-Shaver docks on the Snake River front, has a storage capacity of 7000 bbl. of bulk cement, and is equipped to make customer delivery by either truck or rail throughout its sales territory. The plant will be supplied from the company's 108,000-bbl. Portland, Ore., distribution plant by specially-designed, bulk-cargo steel barges, towed up the Columbia River directly to the plant dock. The barges are unloaded with pneumatic cargo-handling machinery directly to the plant storage silos. New dock facilities were installed at Portland to expedite loading of the barges.

Permanente Cement Co. maintains distribution plants in Alaska, Hawaiian Islands, the Pacific Northwest and northern California, serving these widespread sales territories by company-owned bulk carrier steamships and contract barge lines. The favorable location of East Pasco, at the confluence of the two great rivers, is ideal for the use of barge delivery, which was an important factor in the selection of this site for the new plant.

Research Division Reorganized

THE ARMOUR RESEARCH FOUNDATION of Illinois Institute of Technology, Chicago, Ill., has announced a reorganization of its ceramics and minerals research department as a result of its increased scope of activities. Dr Einer P. Flint, department manager, announced that a new research section has been created and names of three of the four previously existing sections have been changed.

The newly organized ore dressing section, concerned with the beneficiation of both non-metallic and metallic ores, is headed by Dr. Kenneth C. Vincent, formerly chief metallurgist with Baroid Sales Div., National Lead Co. Albert Litvin, who was head of the cement physical testing laboratory at the National Bureau of Standards until 1950, is supervisor of the building technology section, known previously as the masonry materials section. J. Scott Griffith, a staff member at the Foundation since 1941, is supervisor of the geology and mineralogy section, formerly known as the minerals section. Supervisor of the chemistry of mineral products section, formerly called the inorganic technology section, is Samuel W. Bradstreet, Jr., who was associated with Great Lakes Carbon Corp. prior to joining the Foundation in 1948. Dr. James A. Stavrolakis, who was engaged in atomic energy research at Oak Ridge, Tenn., for General Electric Co., until 1952, continues as supervisor of the ceramics section.

Perlite-Gypsum Plant

SCHUMACHER INDUSTRIES, St. Louis, Mo., has received approval from the Dayton, Ohio, Zoning Board of Appeals for the proposed operation of a perlite-gypsum plant in two buildings in Dayton formerly owned by Dayton Malleable Iron Co. Purchase of the two buildings and the cost of placing them into operation was estimated at $250,000. The proposed plant would employ between 150 and 250 persons. The zoning board agreed to permit the operation on assurance that the city's air pollution ordinance would not be violated.

To Open Quarry

BRYAN ROCK AND SAND CO., Raleigh, N. C., is opening a stone quarry near Rawlings, N. C. Production is expected to be about 40 carloads of stone per day. About 100 persons will be employed. A six-month option on 50 acres, with provisions for a 20-year lease, was secured by the company last spring. Officials of the company, which operates eight quarries in North Carolina, stated that the stone is of ideal quality for highway construction and has been tested by both the Virginia and North Carolina highway departments.

Acquires Silica Company

AMERICAN MINERAL & CHEMICAL CORP., Marion, Ky., recently announced it has acquired all assets and assumed all liabilities of the Marion Silica Co. The principal officers of the new corporation, which remain the same as existed with Marion Silica Co., are as follows: N. H. Bogie, president and general manager; J. B. Alexander, first vice-president; W. D. Peyton, second vice-president; and R. R. Holland, secretary-treasurer.

Cover Picture

ON THIS MONTH'S COVER is an illustration of a major feature of the Columbus Rock Company's plant near Columbus, Ga. There are three long, horizontal belt conveyors supported on a structure extending over the open storage area. Below these stockpiles is a long tunnel with a reclaiming belt conveyor. The plant produces a hard crushed stone aggregate from a biotite gneiss or what might be termed a granite with black biotite. An interesting millisecond delay blasting pattern is followed, and the bench system of quarrying is followed.

Silica Sand Plant

SILICA SAND CORP. is operating a new silica sand processing plant at Ottawa, Minn., built at a cost of $300,000, and producing approximately 500 tons daily. The plant was built following extensive tests to determine the quality and extent of the deposit, which is from 100 to 118 ft. in depth, and has an overburden of from 3 to 14 ft. Pipelines carry sand and water to the plant where the sand is washed, screened, graded, and stored in four 500-ton storage bins. Plans for the future include expansion of the plant to a $500,000 project producing 1000 tons daily. Ronald A. Hendrickson is president of the firm which has its offices in Henderson, Minn. Arthur W. Florine is vice-president, and Edwin B. Maurer is secretary-treasurer.

Recovers Fly Ash

NIAGARA MOHAWK POWER CORP., Troy, N. Y., is installing fly ash recovery equipment on one of the smoke stacks at its coal-fired Huntley steam station and, as the market develops for the material, will install additional equipment on the other stacks. The corporation's Oswego, N. Y., steam-electric generating station supplies fly

ash to Anchor Concrete Products Inc. at Cheektowaga, N. Y., for use in the production of concrete block. The fly ash from the Huntley station will be sold to a new company, Atlas Fly Ash Inc., formed by a group of Buffalo, N. Y., citizens including Frederick W. Reinhold, president of Anchor Concrete Products Co.

Fuller Under New Ownership

GENERAL AMERICAN TRANSPORTATION CORP., Chicago, Ill., recently announced acquisition of the Fuller Co. of Catasauqua, Penn., reputed to be the world's leading designer and manufacturer of pneumatic conveying systems for dry bulk materials handling. The transfer includes Fuller Co.'s wholly-owned subsidiaries, Hershey Machine & Foundry Co., Manheim, Penn., and Separation Process Co., Catasauqua.

William J. Stebler, president of General American, in making the announcement, disclosed that the acquisition will be effected by the exchange of General American common stock having a market value in excess of $9,000,000 for all of the outstanding stock of Fuller Co.

Fuller Co. is an engineering and manufacturing organization founded in 1926 by the late Col. J. W. Fuller, to develop and market the Fuller-Kinyon system for conveying pulverized materials. Other classes of pneumatic conveyors were acquired later. Its other primary lines include air-quenching clinker coolers, industrial rotary compressors and vacuum pumps. With its subsidiary, Hershey Machine and Foundry Co., Fuller also produces grey iron and alloy castings, and close tolerance machine work.

Fuller's new Suspension Preheater, for raw materials, has attracted the attention of the cement industry, especially for its potential to extend the economic life of the many short dry-process kilns in operation on the North American continent. The exclusive rights to this invention, for the United States, Canada and Mexico, were acquired from Klockner-Humboldt-Deutz AG, of Cologne, Germany.

Fuller's annual sales are currently running approximately $12,000,000, with its principal markets in the following industries: Portland cement, lime, non-ferrous metals, steel, automotive, aeronautical, petroleum, chemical, brewing and distilling, flour milling, baking, paper, concrete construction and concrete products. District offices are maintained at Chicago, San Francisco, Los Angeles, Seattle and Birmingham. Foreign markets are largely handled by manufacturing and sales arrangements in the principal foreign countries.

Fuller Co. and General American Transportation Corp. have been working in close cooperation for the past eight years in the development and marketing of transportation and handling equipment, which included the development of the Trans-Flo and Airslide railroad cars for bulk materials.

General American Transportation Corp. is probably best known as owner and operator of over 60,000 tank, refrigerator and specialized freight cars, for which the company has widespread manufacturing and repair facilities.

Fuller Co. will continue to operate as an independent corporation, under the same name, with its engineering and manufacturing operations continuing in its present offices and shops. The active management of the company will be under A. E. Douglass, Sr., president; G. K. Englehart, vice-president; J. H. Morrow, vice-president; C. O. Davis, general manager; H. C. Wolbach, treasurer; and A. S. Heffelfinger, secretary, all of whom have served the Fuller Co. in official capacities for many years. J. W. Fuller and C. Thomas Fuller, the principal owners, will retire from their positions of president and vice-president, respectively, to devote their time to the management and further development of their cement interests, particularly the Allentown Portland Cement Co., which is not involved in the present transaction.

Safety Congress

A HIGHLIGHT of the cement and quarry sessions of the National Safety Congress and Exposition, to be held in Chicago, Ill., October 18-22, will be a symposium on the legal, engineering and practical aspects of noise in industry. Scheduled for the afternoon session on October 20, the symposium will begin with a talk on the legal aspects of industrial noise and occupational deafness, by Noel S. Symons, attorney, Brown, Kelly, Turner & Symons, Buffalo, N. Y. The engineering aspects of noise will be covered by J. R. Cox, Jr., acoustical engineer, Liberty Mutual Insurance Co., Boston, Mass. A. B. Hoftzier, safety supervisor, Laverack & Haines, Buffalo, will discuss the practical aspects of noise control in quarries and rock-processing plants. M. C. M. Pollard, director of safety, National Gypsum Co., Buffalo, and general chairman of the National Safety Council's Cement and Quarry Section, will preside.

A motion picture, "Safe Blasting Practices in Open Pit Mines," will be presented at the afternoon session of the following day, by G. A. Borgeson, claims manager, M. A. Hanna Co., Hibbing, Minn. Howard Riefenstahl, safety director, Alpha Portland Cement Co., Easton, Penn., will speak on proven aids to better safety. Sessions of general interest, covering such topics as safe handling of materials, industrial noise, accident costs, nuclear developments, civil defense, industrial solvents, better seeing and effective communications for improved safety, will be presented by the American Society of Safety Engineers. The exposition, with its 238 display booths, reportedly will be the largest and most comprehensive exhibit of accident prevention equipment ever shown at these meetings.

Purchases Ebsary Gypsum

THE RUBEROID CO., New York, N. Y., has added gypsum products to its line of building materials with the acquisition of Ebsary Gypsum Co., Rochester, N. Y. The purchase included a gypsum wallboard and plaster plant at Wheatland, N. Y., as well as gypsum properties contiguous with the plant. It will be operated as a Ruberoid division, with sales handled by the present sales staff. The Ruberoid Co. also operates 16 asphalt roofing and asbestos-cement plants in the United States, and an asbestos mine in Vermont.

Acquires Slag Company

THE R. P. MCMINDES, INC., Ashland, Penn., shipper of cinder aggregates, has announced acquisition of an interest in the Sheridan Slag Co., Sheridan, Penn. A new crusher has been added to the original plant and the McMindes company states that it plans to start shipping processed blast-furnace slag to block plants in the near future.

Sand and Gravel Expansion

SOUTHERN OHIO MINING CORP., Newton, Ohio, has doubled the size of its sand and gravel holdings, with the purchase of a 36-acre tract for a reported purchase price of $100,000. The newly-acquired property adjoins the company's present 35-acre tract on which the company has been carrying on sand and gravel operations for the past two years.

Gypsum Plaster Plant

KAISER GYPSUM CO., INC., has opened a new plant for the production of plaster retarder, costing about $110,000, adjoining its Long Beach Calif., gypsum products plant. It is said to be the only one of its type west of the Mississippi River.

Gravel Permit

PRE-MIX CONCRETE, INC., Pasco, Wash., has been granted a permit for erection of a $15,000 gravel plant along the Columbia River northwest of Pasco.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 22,802,000 bbl. of finished cement during June, 1954, as reported by the Bureau of Mines. This was an increase of about ½ percent compared with the June, 1953, output. Mill shipments totaled 28,632,000 bbl. in June, 1954, an increase of 8 percent over that of June, 1953, while stocks were 9 percent lower than those on hand for the same month of the preceding year. Clinker production during June, 1954, amounted to 21,125,000 bbl., a decrease of 5 percent from the June, 1953, figure. The production of finished cement during June, 1954, came from 147 plants located in 37 states and Puerto Rico, compared with 156 plants producing 22,698,000 bbl. during the month of June, 1953.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of August were listed by the Portland Cement Association as follows:

	Sq. yd. awarded during August, 1954
Roads	3,408,035
Streets & Alleys	3,272,466
Airports	1,710,988
Total	8,391,489

Vote Stock Increase

MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., has increased its authorized capital stock from 300,000 to 500,000 shares, as announced at its annual shareholders meeting. The company does not plan to issue the additional shares at present, but if developments warrant it, preemptive rights of the stockholders will be recognized.

U. S. Gypsum Expansion

UNITED STATES GYPSUM CO., Chicago, Ill., has started an $11,000,000 expansion program which includes a new gypsum wall-board and plaster plant at Shoals, Ind.; expansion of the Jacksonville, Fla., plant to double its capacity; and the addition of a new steamship to supplement its present fleet serving Atlantic seaboard plants.

Sand and Gravel Plant

LAKEPORT SAND AND GRAVEL CO. has begun operations at its new sand and gravel plant at Lakeport, Mich., on a 10-acre tract near Lake Huron. Facilities include a washing and processing plant, a crane with a 55-ft. boom, bulldozers and accessory equipment.

Concrete Short Course

THE NATIONAL READY MIXED CONCRETE ASSOCIATION has announced that the two consecutive weeks in November which were tentatively proposed for the Concrete and Concrete Aggregate Short Courses, are not available, due to some changes in the University program. The course is thus being restricted to one week, November 12-19, inclusive.

Expands Gypsum Plant

THE CELOTEX CORP. has started a $3,000,000 modernization and construction program at its Port Clinton, Ohio, gypsum plant. The equipment and buildings, providing an additional 125,000 sq. ft., are designed for eventually doubling production.

Sand and Gravel Plant

BECKER COUNTY SAND AND GRAVEL CO., Crosby, Minn., which operates 27 plants including six in the southeast, is establishing a new plant at Senter, N. C., for the production of washed sand and gravel.

Moves Office

CANADA CRUSHED AND CUT STONE, LTD., has announced the removal of its head office to the Harbour Administration Building, 605 James St. N., Hamilton, Ont.

Coming Conventions

October 18-22, 1954—
National Safety Council, 42nd Congress and Exposition, Conrad Hilton, Congress, Morrison and LaSalle Hotels, and Palmer House, Chicago, Ill.

October 5-9, 1954—
A.I.M.E., Industrial Minerals Division, Annual Fall Meeting, Whiteface Inn, Lake Placid, N. Y.

October 20-22, 1954—
National Industrial Sand Association, Fall Meeting, Hotel Plaza, New York, N. Y.

October 25-27, 1954—
American Concrete Pipe Association, Fourth Annual Short Course School of Instruction, Statler Hotel, St. Louis, Mo.

October 28-29, 1954—
American Concrete Institute, Regional Meeting, Statler Hotel, Los Angeles, Calif.

Oct. 28-Nov. 2, 1954—
North Carolina Concrete Masonry Association, Annual Meeting, On Board the Swedish Liner "Stockholm" to Bermuda.

January 9-13, 1955—
National Ready Mixed Concrete Association, Silver Anniversary Convention, Miami, Fla.

January 9-13, 1955—
National Sand & Gravel Association, 39th Annual Convention, Miami, Fla.

January 12-13, 1955—
Wisconsin Concrete Products Association, 35th Annual Convention, Plankinton Hotel, Milwaukee, Wis.

January 17-18, 1955—
National Agricultural Limestone Institute Inc., 10th Annual Convention, Hotel Statler, Washington, D. C. Executive Committee, January 15, Board Meeting, January 16.

January 24-27, 1955—
National Concrete Masonry Association, Convention and Exposition, Cleveland, Auditorium, Cleveland, Ohio.

February 7-9, 1955—
National Crushed Stone Association, 38th Annual Convention, Netherland Plaza Hotel, Cincinnati, Ohio.

February 21-24, 1955—
American Concrete Institute, 51st Annual Convention, Hotel Schroeder, Milwaukee, Wis.

HINTS AND HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Station along belt conveyor where clay balls are removed

Hand-Picking Clay Balls

AT A SAND AND GRAVEL PLANT in the South, clay balls were present in relatively large amount in the pit run material. Hand-picking at several stations was the general practice. At a station along the primary belt conveyor, a workman removed the larger clay balls with a short-handled rake, pulling the clay balls toward himself with a quick, hook-like motion. The clay balls fell into an improvised bin that was originally the body of a bottom-dump truck. The bin was mounted at such an elevation that it would be emptied by dumping direct to a truck which hauled the clay balls to the disposal area.

One Belt Conveyor for Two Sources of Aggregate

A NEAT ARRANGEMENT for supplying aggregates to a concrete block plant was observed in a southern operation. The company produced its own aggregate from a plant adjacent to the block plant. A belt conveyor operates in a reclaiming tunnel under the aggregate pile at the extreme right in the illustration. Should any special sizes of aggregate be needed in the block plant, a loaded truck moves up a ramp to a hopper mounted over the same reclaiming belt conveyor and dumps into the hopper.

Hopper over reclaiming belt is reached by trucks operating up the ramp

Remote Controlled Hook

IN THE ILLUSTRATION is a hook arrangement which may have applications in the rock products industries. It is called a Mittry hook, named after its inventor, which can be opened and closed by the operator in the cab of the crane. It is air-operated with a flexible tube connecting the air cylinder on the hook to a receiver mounted well up the boom of the crane.

Safety devices prevent the hook from opening when it is carrying a load. The photograph was taken at Oahe dam, now in the early construction stages on the Missouri river near Pierre, S. Dak. This dam will be the second largest dirt-fill dam in the world but its construction involves a large amount of concrete. Mittry Constructors have the contract for the concrete work on the outlet construction. It is a U. S. Army, Corps of Engineers project.

Hook suspended from crane that can be opened pneumatically by operator sitting in the cab

Precast Tunnel for Conveyors

AT A NORTH DAKOTA SAND AND GRAVEL PLANT, precast concrete "cattle passes" are used under storage piles as reclaiming belt conveyor tunnels. Cattle-raising is an important industry in this area, and where highways cut through a grazing area tunnels under the highways are provided so that cattle can wander from one side of the highway to the other without danger. Tunnels are made up of reinforced, precast concrete units.

In adapting the cattle passes for a reclaiming belt conveyor tunnel, the square section, shown to the left in one of the illustrations, is the end segment under the stockpile with the square opening used for the gate. In casting it, the form for the cattle pass was borrowed from a local concrete products manufacturer who supplied the remainder of the tunnel segments. A 40-ft. section of belt conveyor is in each tunnel. Two of the oval sections and the square, back-end section are used in making the tunnel. To feed the reclaiming belt conveyors, Cedarapids reciprocating feeders are used.

Reinforced, precast concrete "cattle pass" sections, above, make up reclaiming belt conveyor tunnel, below

Motor Shelters

SHOWN IN THE ILLUSTRATION are three Eagle single-screw, fine-material,

Slotted steel drum halves placed over electric motor and shaft form protective covering against dust, rain and snow

washer-classifier dehydrators installed at the plant of Pine Hill Concrete Mix, Bowmansville, N. Y. To protect the motors, several 55-gal. steel drums were cut in half with a slot cut on one side so that the drum halves could be placed over the electric motor and the shaft of the motor powering the three units. The drums are said to form a very effective protective covering against entry of dust, rain and snow.

Cleaning Up Barges

AT AN OPERATION on the Mississippi river where a tug and barges haul the finished sand and gravel from the plant to a distribution yard, a front-end TractoLoader supplements the clam shell-equipped crane in the unloading operation. The clam shell starts unloading near one end of the barge, and as soon as there is any danger of the bucket hitting the deck of the barge, the front-end loader is attached to the boom of the crane by slings and lowered into the barge. The front-end loader keeps pushing the material close to the deck of the barge into piles ahead of the clam shell. This arrangement not only saves time but protects the steel deck of the barge from damage by the clam shell.

Front-end loader pushes material into piles on deck of barge convenient for handling by clam shell-equipped crane

Two-Purpose Tug Bumper

WHERE TUG BOATS push barges loaded with aggregates, the steel bumper, shown in the illustration, serves two purposes; its primary purpose as a bumper and for steps so that deck hands can easily reach any part of the tug-barge train. There are two bumpers on this tug.

Tug bumper which also incorporates steps

Rubber-Mounted Gyratory

AT A LARGE CRUSHED STONE PLANT in the east, a 1260 Allis-Chalmers gyratory crusher was installed to replace two hammer mills. An unusual feature of this installation is that the crusher is mounted on rubber pads. When the unit is in operation, the movement of the crusher on the pads is easily seen.

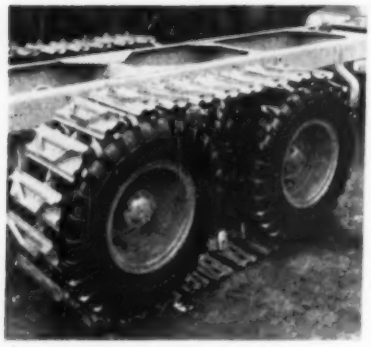
Gyratory crusher mounted on rubber pads to absorb vibration

Stone Boxes Save Belts

STONE BOXES at belt conveyor transfer points are simple to install and can prolong the life of the belt receiving the impact. The two illustrations of stone boxes were taken at widely separate points in the United States. In one of the illustrations, the belt conveyor delivering stone to the other belt was installed at sufficient height to permit the use of a box of generous size. All transfer points in the plant used a box of this type. It will be noticed in the other illustration, that the stone box is made up of eight smaller boxes welded together like flights on a staircase.

Two types of stone box to take impact at belt conveyor transfer points

NEW MACHINERY



Traction-Flotation Device

THE UNION CHAIN & MANUFACTURING CO., Sandusky, Ohio, recently announced Galanot Tire-Tracks, a traction and flotation device comparable to a crawler mount, designed to provide a maximum of flotation and tractive effort under extreme conditions for many types of rubber tired vehicles. Built with variable shoe lengths and with versatile chain arrangements, the device can be applied to dual or single tires on either single or tandem axles. With a connector plate lacing varying from 1 x 2 to 6 x 6, and in special cases, higher, the tracks handle loads as high as 60,000 lb. The shoes and flexure members are designed to provide a self-cleaning feature.

Agstone Spreader

HENDERSON MANUFACTURING CO., INC., Cedar Rapids, Iowa, has brought out the "Chief" agstone and fertilizer spreader with sloped 45-deg. sides to assure free material flow, and a 24-in. floor to prevent bridging. The truck P.T.O. driven spreader features heavy-duty cone drive, double-enveloping gearsets, assembled in high strength corrosion-resistant cast aluminum alloy cases. A double row radial-thrust bearing is used to accurately position the worm. The gear ratio is 50:1. The hardened steel gears are housed in twin distributor gear cases, also of corrosion-resistant aluminum alloy. Spring steel retaining rings position the gears and the sealed ball-bearing units on the 1-in. shafts, thus eliminating set screws which may work loose.

The hoppers are of heavy gauge high tensile, corrosion and abrasion-resisting steel sheets, position welded in jigs for strength. Specially designed conveyor sprockets are incorporated to prevent chain climb, jump or packing of material at the base of the teeth. Safety plate catwalks are supported by formed steel members. The spreader is available in 9-, 11-, 13- and 15-ft. lengths. Optional equipment includes a two-speed transmission with a fixed ratio distributor drive; quick-acting disconnect clutch; fertilizer hood and automatic conveyor chain oiler arrangement.

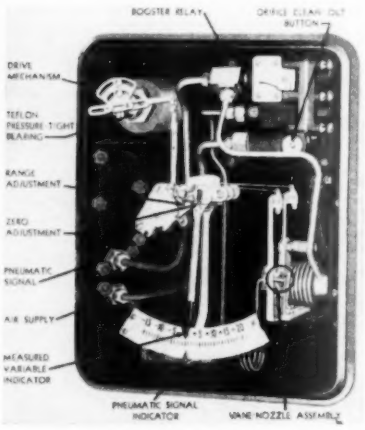
Belt Idlers

THE JEFFREY MANUFACTURING CO., Columbus, Ohio, has introduced MD and HD Series belt idlers with Duoflex dual flexible contact seals designed to keep dirt out and retain grease. The idler design permits re-greasing from either end through the shaft, the grease reservoir and the "Neoprene" shaft connectors. The rolls are held in place by means of straps on the center and end stands, and may be removed without loosening or removing the stands. The locked-in type construction, through the grooved adjusting nuts, provides a rugged, truss-type construction to the assembly.

Extra heavy, electric welded steel pipe form the belt carrying rolls which are machine-beveled on the ends. A 2-deg. tilt in the direction of belt travel tends to give the center roll of the troughing idler more control over the belt. Auxiliary units include: idlers; plain return idlers; return training idlers; spool return idlers; and spool return training idlers.

Tractor-Shovel

THE FRANK G. HOUGH CO., 705 Seventh St., Libertyville, Ill., has brought out "Payloader" Model HRC, a 4-wheel-drive unit with a 1-cu. yd. struck-load bucket capacity and 1⅓-cu. yd. heaped payload. It is available with either a gas or diesel engine and is equipped with power-steering. A heavy-duty full-reversing transmission provides four speed ranges in each direction. The torque-converter drive is said to provide fast operation, act as a cushion for the power-train, minimize maintenance, and prolong machine life. The hydraulically-controlled bucket features "quick tip-back" action which automatically positions the bucket for digging.



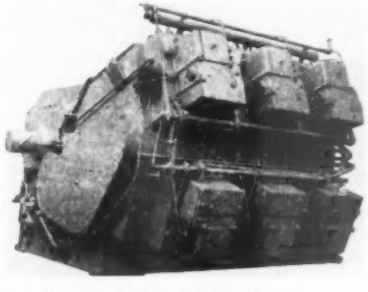
Pneumatic Transmitter

BAILEY METER CO., 1050 Ivanhoe Rd., Cleveland 10, Ohio, has introduced the Bailey pneumatic transmitter for transmitting measurements of flow, level, pressure, temperature, draft, differential, and vacuum. The

measuring element actuates the microsensitive vane, nozzle, and booster assembly. Transmitted signals of 3-15 and 3-27 p.s.i.g. may actuate pneumatic receivers and/or controllers. Both the measured variable and pneumatic signal are indicated on a common scale for checking and comparison. The casing is weather, vibration and corrosion resistant. Transmitting distances can be 100 ft. to receivers, 400 ft. to controllers. The unit is approximately 8 x 10 x 3½ in.

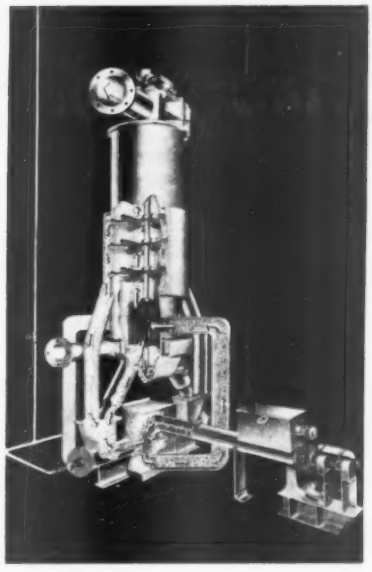
Conveyor Belt

B. F. GOODRICH CO., Industrial Products Div., Akron, Ohio, has developed a rubber conveyor belt featuring ribbons of high tensile steel wire, inserted at intervals up to 3 ft., to help prevent accidental rips from running the entire length of the belt. The wire ribbons are positioned beneath the first fabric or cord ply and placed across the width of the belt. When used in combination with the patented transcord breaker or longitudinal nylon cord breaker, the development is said to increase belt life up to 50 percent. This construction is available in a variety of belts, including all types of hot material conveyor belts.



Horizontal Diesel Engine

PAGE ENGINEERING CO., Clearing Post Office, Chicago 38, Ill., has brought out a compact V-6 horizontal diesel engine, built especially to provide power to the load and hoist drums of Page walking draglines. The engine features a short, rigid crankshaft as well as horizontal piston travel. By removing the crankcase cover, the pistons and connecting rods are exposed and can be removed without disturbing the cylinder heads or the crankshaft. The valves can be individually adjusted and timed from the head end, and the cylinder heads can also be inspected and removed individually. Virtually all parts of the V-6 are interchangeable with the auxiliary 3-cylinder horizontal engine used to drive the generator for the swing motors on walking draglines. Except for the engine frame, camshaft, crankshaft and timing gears, the engines differ only in the number of cylinders. The V-6 is available with a bore and stroke of 12½ x 16 in., and another model, with a bore and stroke of 11 x 15 in.

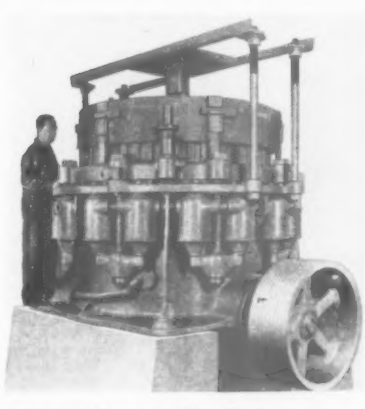


Pulverizer

MAJAC, INC., 23rd St. at P.R.R., Sharpsburg, Penn., has announced the incorporation of a "rock-stripper" phase in the design of Jet pulverizing machines. The rock stripper phase removes foreign particles of great specific gravity immediately after the material to be pulverized is introduced into the machine, thus accelerating the entire pulverizing process. Materials are injected through opposing guns by means of high pressure gas jets, creating head-on collisions of the materials against themselves under high velocity. Precise control of fineness is said to be obtained, as well as exact particle size distribution, or concentration of the end product into predetermined percentages of different micron sizes. The equipment is suitable for reduction of a wide range of chemicals and minerals, including limestone, clays, graphite, feldspar, alumina, vermiculite, paint pigments, etc., and is also used for exfoliation of fibrous materials such as asbestos and mica.

Maintenance Coating

MAGIC CHEMICAL CO., 121 Crescent St., Brockton 2, Mass., has announced Magic-Vulc neoprene maintenance coating No. 245-B, a paint-like liquid high in solids, which may be brushed or sprayed on metal, concrete, wood, plastic, glass, etc. It is said to resist the action of oils, alkalis, sunlight, sea water and other corrosive conditions, and, as it is elastic, it is reported not to crack under extreme weather conditions and rapid temperature changes. The coating may be used for resurfacing worn conveyor belts, especially where oily conditions exist; protection of steel structures or equipment; as an anti-skid coating; sealing compound; for pulley lagging, etc. The above illustration shows the interior of a blower installation for handling acid fumes, which is treated with the coating.



Fine Reduction Crusher

NORDBERG MANUFACTURING CO., Milwaukee, Wis., has introduced the Gyradisc crusher, built to supplement Symons cone crushers and to provide a finer reduction. The reduction principle differs from that employed in most gyratory-type crushers. The process consists of alternately impacting

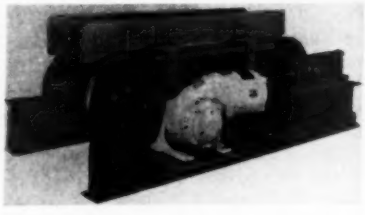
and releasing a thick mass of material. Relatively large particles combined in an intimately mixed feed which is automatically distributed throughout the crushing chamber is said to prevent packing of the mass and assure high output. Mixing and feeding are accomplished and controlled by the compound action of gyration and rotation of the feed distributor.

A positive pneumatic release mechanism holds the bowl structure rigidly to the main frame. This mechanism responds quickly to any overload and provides automatic protection against damage from tramp iron or other noncrushable material. In case of power failure, the crusher cavity need not be cleaned out before starting. The air in the system can be quickly released, the crusher started and in a matter of minutes, normal operating air pressure is restored.

Also included among the features are: ease of adjustment to product size; a pressure lubrication system to all moving parts with a pressure safety switch assuring prolonged life; and a liquid dust seal to prevent entry of damaging dust to vital moving parts. The unit is particularly suited for preparation of finer feeds, when required for rod or ball mill grinding operations. The crusher is available in the 54-in. size, the ideal feed being a product containing material minus 1, ½, or ⅜ in., with or without fines. It may, however, operate in closed circuit with fines separated by pneumatic or mechanical methods.

Multiple Action Bag Packer

E. D. Coddington Manufacturing Co., 5044 N. 37th St., Milwaukee 9, Wis., has developed a multiple action Auger-matic Bag Packer for packing powdered, granular, pellet and fibrous materials. It features a shaker which shakes each bag during the filling process to prevent slack-filled bags and to permit the use of minimum size valve bags. A security clamp holds the bag in place, and may be released by raising a handle. A special feeder-matic unit with a built-in positive feeding auger insures free flow of fibrous materials. Other advantages include a snug fitting spout to minimize dust hazards, and caster-mounting for easy movement.



Magnetic Separator

Magnetic Engineering & Manufacturing Co., Clifton, N. J., has introduced a self-contained magnetic separation unit for automatically removing tramp iron from conveyed materials. It is available in electromagnetic or Alnico non-electro designs, in stationary or portable, horizontal or inclined, open or fully enclosed models. The "radial design" allows ferrous material to bridge the magnetic gap, providing extra strong cross-pole pull through magnet placement perpendicular to the pulley circumference. The unit may be furnished equipped for belt drive or with a unit motor drive. First grade rubber belts are included as standard equipment, but special type belts can be supplied.

Stainless Steel Electrodes

Pacific Welding Alloy Manufacturing Co., 310 North Avenue 21, Los Angeles 31, Calif., has brought out a line of 15 different stainless steel welding electrodes designed for use with either a-c. or d-c. The extrusion method of application is utilized to provide a coating of uniform thickness, concentricity and density. The coating is designed to prevent oxidation of the weld metal and to maintain the same physical properties and chemical analysis as the parent metal. A full covering slag protects the weld metal while cooling, and is said to be easy to remove.

Power Swing Jumbos

Gardner-Denver Co., Quincy, Ill., has announced power swing jumbo booms, hydraulic pumps, and remote-controlled drill positioner units, available for mounting on a truck, tractor, half-track, jumbo carriage or other available chassis. The booms are available in lengths up to 168 in., and swing hydraulically through a horizontal arc. The boom is also raised and lowered hydraulically through a vertical arc. The hydraulic drill positioner at the end of the boom is remote-controlled through a control box which may be mounted in a convenient spot on the carriage. A chain feed or a shell feed drill mounting may be used with the swing and dump unit, and the drill used can be a 3-, 3½- or 4-in. Gardner-Denver drifter or the DH99 deep hole drill. Each drill can be equipped with remote controls for regulating drilling speed, feed rate, hole cleaning and steel extraction.

The hydraulic pump unit, powered by an air motor, supplies hydraulic power for the swings and controls. The large hydraulic cylinders are said to hold all positions without "creep." These boom and control units are the same as those mounted on the self-propelled Model JSP Mobiljumbo for use in remote-controlled drilling operations.

Twin-Drill Rig

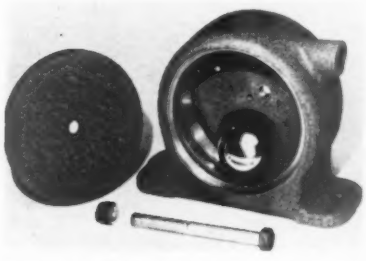
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., has brought out a self-contained and self-propelled twin-drill rig, the Drillmaster, for heavy-duty wagon drill type jobs. The unit includes two hydraulic booms, two 10-ft. wagon drill towers, two heavy-duty X-71-WD rock drills, a rugged crawler assembly and a 600-ft. Gyro-Flo rotary compressor. It will drill holes up to 18 ft. 6 in. between centers, with an 8-ft. steel change. It features two-man operation, has a speed of 2 m.p.h. on level ground, and can handle a 15 percent grade.

Welding Rod

Crobalt, Inc., 2800 S. State St., Ann Arbor, Mich., has brought out cobalt-chromium-tungsten hard-facing alloys in welding rod form, known as Crobalite alloys. The alloys can be applied to steel and cast iron parts to provide hardness and resistance to abrasion, corrosion, oxidation and impact. They are reported to retain these properties at red heat, to be heated to 1600 deg. F. with no permanent loss of hardness, and to be unaffected by repeated heating and cooling.

These alloys are applied by oxy-acetylene torch or inert arc welding,

either manually or by semi-automatic machine, using standard hard-facing procedures. They are said to flow on readily in a uniform, slag-free layer, and bond firmly with minimum inter-alloying.



Rotary Vibrator

VIBER CO., 726 S. Flower St., Burbank, Calif., has introduced the Airo-Viber rotary vibrator designed to break up arching or jamming of bulk materials in bins, hoppers, chutes, feeders, etc. The only moving part is a steel ball, which is air-jet blown at high speed around a hardened steel track in the housing. The weight of the ball develops a centrifugal force to provide the necessary vibration. Other advantages are said to include: performance at high or low temperatures; does not require lubrication; quiet operation; and convenience for hard to get at locations.

Hardsurfacing Rod

MIR-O-COL ALLOY CO., 312 North Avenue 21, Los Angeles 31, Calif., has brought out the "BR" hardfacing rod, designed specifically to withstand extreme abrasion and heavy impact. It is available for either electric or acetylene application, and features multiple pass characteristics. Worn parts originally rebuilt with the rod can be rebuilt over and over again with the new metal forming a permanent bond with the previous deposit. The balance of its alloy content, chrome, nickel, molybdenum, and tungsten, is said to provide a fast burn off rate.

Belt Conveyor

BARBER-GREENE CO., 400 N. Highland Ave., Aurora, Ill., has announced standardized belt conveyors for "short hauls," designated "Transfer Conveyors." Mounted on a 5-in. channel frame, the conveyor is available in 18-, 24- and 30-in. belt widths and in lengths from 8 to 44 ft. Due to the channel frame construction, it can be used in underground installations or where headroom is limited. Among the features offered are: electric power units; crowned steel head and tail pulleys, ball bearing mounted; 4-in. dia. ball bearing troughing carriers; and full Alemite lubrication. Capacities range from 50 to 480 t.p.h., depending upon the belt width and the weight of the material being handled.

Tractor Attachments

MIDWESTERN INDUSTRIES, INC., 1009 South West St., Wichita, Kans., has brought out the hydraulically-operated Davis Pit-Bull, a basic unit with 11 attachments, for installation on Ford or Ferguson tractors. These attachments include a ⅝-cu. yd. bucket, a back-hoe that digs 10½ ft., a trencher with a digging depth of 5 ft., an 8-ft. rotary broom with a 60-deg. operating arc for sweeping at angles, a 72-in. dozer blade, a swinging crane, a 45-in. roller with 100 p.s.i., a rotary mower which pivots 180 deg. for side mowing, a lift fork with a 2500-lb. capacity, a 350-lb. hammer, and a 5-ft. auger. A plexiglass cab, with a light metal frame and sliding windows, is available.

Installation is done by Mid-Western dealers, and includes reversing the tractor driver's seat and controls, and putting a syncro-mesh transmission beween the clutch and standard transmission. This seating and control arrangement is designed to provide maximum maneuverability, visibility and control. The syncro-mesh transmission provides four speeds in each direction, and change of direction without gear shifting.

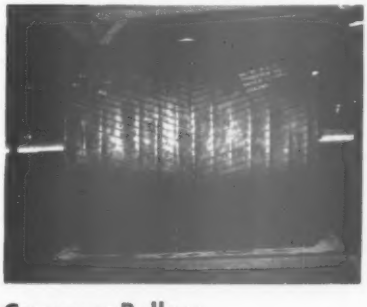
Twin hydraulic rear lift arms mounted on the superstructure form the remainder of the unit. An extra large oil reservoir on the front of the tractor contains the pump and filter to eliminate pump "starvation," and to serve as a counter-weight. A supply of quick couplers on hydraulic hose connections aids in the change-over from one attachment to another.

High-Speed Electrode

RESISTO-LOY CORP., Grand Rapids, Mich., has developed a welding electrode containing 11½ to 13 percent manganese - nickel steel, designated "Manga-Kote." The electrode is an all-position rod for welding at high speed, with the alloys in the rod and not the coating. This is said to eliminate the special techniques of application required in welding manganese-nickel steel, and to eliminate peening. It will bond to manganese, carbon and nickel steels, and is reported to weld large, bulky parts too heavy to position for down-hand welding, such as bucket sides, tractor rollers, grousers, gear teeth and crusher rolls in portable crushers without removing the rolls.

Deep Hole Drill

E. J. LONGYEAR CO., Minneapolis, Minn., has announced the "44" diamond core drill, which will be introduced at the 1954 Mining Show in San Francisco. Designed for deep drilling, it has a capacity of 3000-4000 ft. of "A" rods. A hydraulic swivel head handles standard rod sizes, including 2 ⅞-in. flush-coupled rods and Longyear Wire Line rods. An extra capacity hoist, with planetary gears, has oversize brake bands and metallic linings for safe and rapid operation. Gasoline, diesel, air or electric motor power is available. Controls are centrally located, and a low center of gravity permits safe movement without tipping.



Conveyor Pulleys

THE AMERICAN PULLEY CO., 4200 Wissahickon Ave., Philadelphia 29, Penn., has announced a line of "HD" heavy-duty steel conveyor pulleys with tapered-hub construction. The pulleys are supplied with interchangeable "Wedg-Tite" split tapered hubs, which when drawn into the pulley end-disc, provide a positive shaft grip, eliminating pulleys "walking" on the shaft. This feature also locks the hub to the end-disc. The pulleys are available in either crown or straight face, in sizes ranging from 6- through 60-in., from 12- through 63-in. face and for shaft sizes through 10-in. dia.; also available with a corrosion-resistant coating.

Wagon drills sinking blast holes in quarry

A 2-cu. yd. shovel loading stone into haulage unit

Improve Plant and Quarry Practices for

By **WALTER B. LENHART**

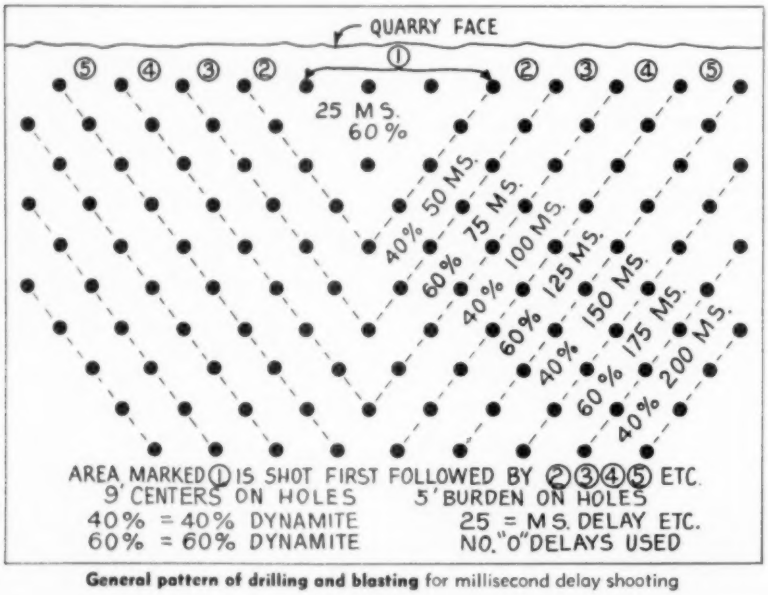
ALTHOUGH THE COLUMBUS ROCK CO., Columbus, Ga., started operations in 1952, several important changes in operating practices and plant alterations have been made in this short period. The plant is located 4 miles north of the city limits.

The material being quarried is a biotite gneiss, containing biotite mica, quartz and feldspar. The rock can be classed as a granite with the black biotite a dominant mineral because of its jet black color and tendency to be in the matrix with banded characteristics.

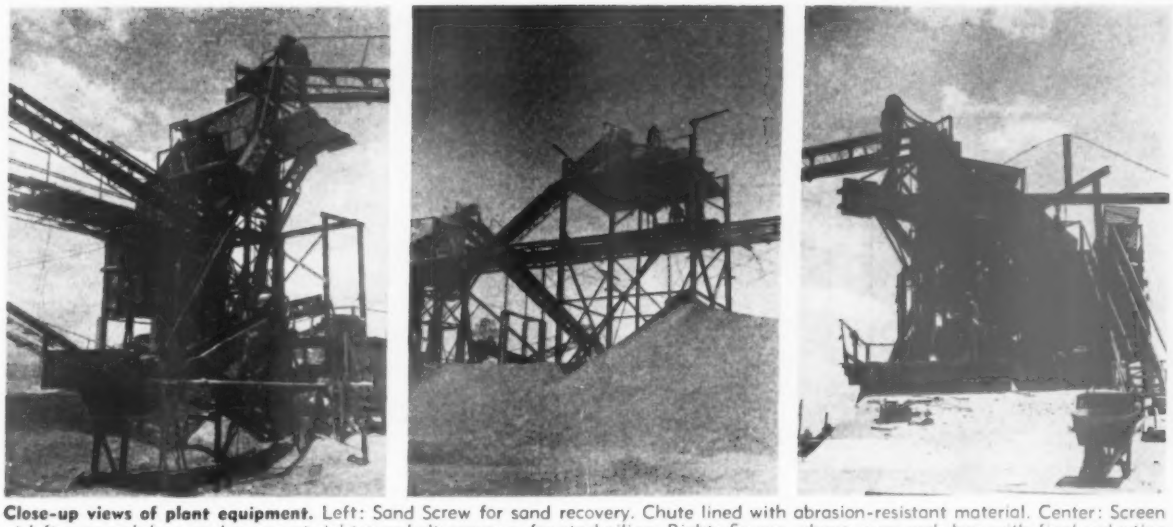
Improve Blasting Technique

Preliminary blasting technique in the quarry was built around an adaptation of hard rock tunneling methods where a "V"-cut is first shot out of the face, followed by several "breast" cuts so as to retain the "V" structure. The face of the quarry is relatively low, and is operated on a multi-bench system with the present operating face about 18 ft. high. Holes are drilled 2 ft. below the floor level, on 7 ft. centers, with 5-ft. burden. At the outset, the holes were located on 9 ft. centers with 5-ft. burden. For the second row, the holes are staggered with respect to the first row, and the third row is spotted similar to the first; the fourth similar to the second, until the area to be shot is drilled out as shown in the sketch. Ten holes that form the "V"-cut near the center of the face are shot first, using a fast dynamite. The second row, forming the "V", follows, using a slower dynamite. The next row forming the "V" is shot with a fast dynamite, and this alternate banding of the shots is continued until the bench is shot; 25, 50, 75, 100, 125, 150, 175 and 200 millisecond delay caps are used. No zero delays are used. In essence, this technique means that after the first "V"-cut is out of the way, the slow dynamite follows. While the debris from the slow dynamite is still in suspension, the fast dynamite detonates and throws its debris into that already in suspension. This situation continues until all the bench is shot. All dynamites are 60 and 40 percent, respectively. At present 1¾- x 6-in. sticks are used whereas 1½- x 8-in. had been used.

At the outset the holes were loaded with the fast explosive in the bottom


QUARRY FACE
⑤ ④ ③ ② ① ② ③ ④ ⑤
25 MS. 60%
40% 50 MS.
60% 75 MS.
40% 100 MS.
60% 125 MS.
40% 150 MS.
60% 175 MS.
40% 200 MS.
AREA MARKED ① IS SHOT FIRST FOLLOWED BY ②③④⑤ ETC.
9' CENTERS ON HOLES
5' BURDEN ON HOLES
40% = 40% DYNAMITE
60% = 60% DYNAMITE
25 = M.S. DELAY ETC.
NO. "0" DELAYS USED

General pattern of drilling and blasting for millisecond delay shooting



Close-up views of plant equipment. Left: Sand Screw for sand recovery. Chute lined with abrasion-resistant material. Center: Screen at left over rock box, and screen at right over belt conveyor for stockpiling. Right: Screen, above, over rock box with final reduction crushers, below

Maximum Production

• Columbus Rock Co., Columbus, Ga., redesigns plant and equipment, and changes technique for drilling and blasting a hard granite

and the slower on top. Later experimental work indicated that explosive strength was not as important as had been believed.

It might be questioned why the first "V" was not shot with a slow explosive to achieve the advantages of additional fragmentation resulting from projectile collision. Actually this was done on several blasts and with excellent results, but it was found that with each blast a few rock fragments would rise vertically and, instead of making an arc so as to fall on the quarry floor, the fragments reversed the normal direction of the arc and would land well back on the rim. As there were several dwellings in the area behind the quarry, these fragments presented a hazard. By shooting with the fast explosive to break out the first "V", this behavior was corrected.

By the adoption of the newer blasting technique, the explosive factor was increased from 2½ tons of rock per pound of dynamite to 2¾ tons and with better fragmentation. Delay period sequences and speed are given all the credit for the improvements and not explosive strength. No holes have been cut off following this practice.

Improve Chute Wear

A second improvement related to wear in chutes. A considerable number of different abrasion-resistant materials were tried, but the company finally settled on Jalloy, an abrasion resistant plate supplied by Jones & Laughlin Steel Co., as it does a good job and costs around 15 cents per pound compared to 40 cents and higher for some other types of impact-resistant materials. At one point in the operation ahead of the two tertiary reduction crushers, a stone-box was later installed. Two short, flat-running belt conveyors take the stone from the box and deliver it to the crushers. Chutes were formerly used.

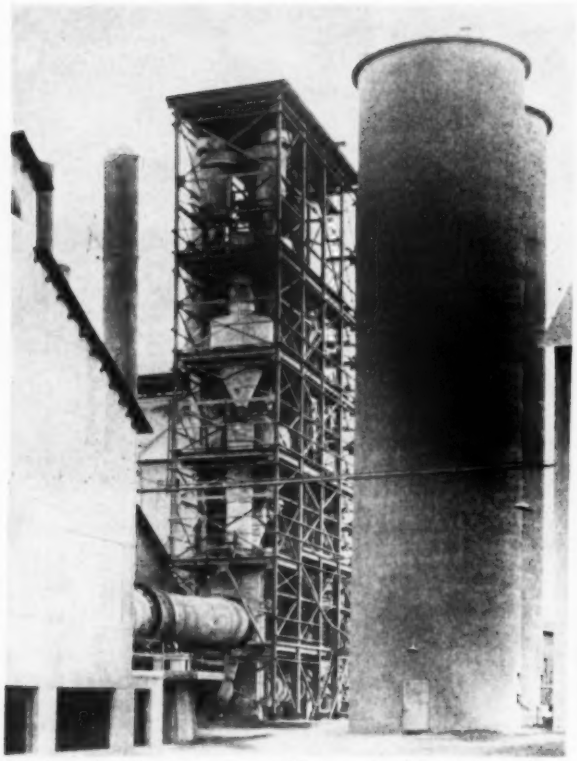
The mantels on the Traylor tertiary crushers were rebuilt, using manganese round bars placed on with Mangalloy electrodes and hardsurfaced with No. 48 Rex-arc. The rods are put on in a spiral fashion, using 1-in., ⅞-in. and ½-in. dia. rods with the 1-in. at the bottom. It takes about three days of steady work to do the job. The practice is to wear out a new mantel and then build it up. When it is worn out the second time, the mantel is discarded. The life of the new and built-up mantels are the same. The company obtains 20,000 tons per set of mantel and concaves.

One interesting and very important series of changes relates to the primary

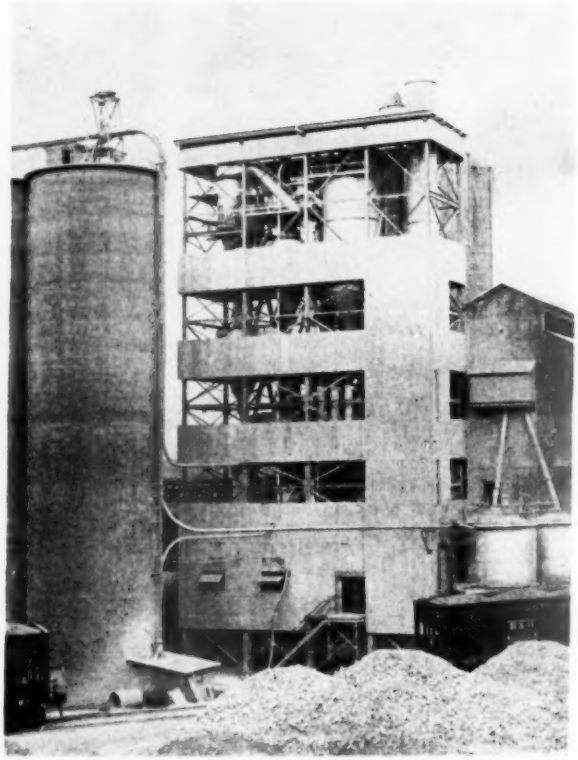
(Continued on page 105)

Primary jaw crusher may be seen, to the right, with secondary gyratory crusher and scalping screen, to the left

Overall view showing conveying system with finishing screens, to the left



Relation of preheater to 8- x 125-ft. rotary kiln is shown here. Photo was taken before preheater structure was enclosed



Preheater structure after installation of siding

Cut Fuel Cost and Increase Output With Suspension Preheaters

• Operating data on Allentown Portland Cement Co., and European installations prove the outstanding economies in preheating raw materials suspended in cement kiln exit gas streams

By BROR NORDBERG

PREHEATING of dry, pulverized portland cement raw materials while in suspension in rotary kiln exit gases, has been proved practical and to have great economical potential, at the Evansville, Penn., plant of Allentown Portland Cement Co. The process has been in full-scale operation in this plant for better than a year, during which it has undergone exhaustive study in order to determine its full possibilities and the best method of operation for optimum fuel economy and maximum production of cement clinker.

In this process, the pulverized raw materials are preheated in suspension in the kiln exit gas stream in what may be best described as a multi-stage counterflow system. The gases are drawn through a series of cyclone collectors. Raw material introduced into the closed system, consisting of the cyclones and connecting ducts, enters the successive cyclones and is alternately collected in the separate cyclones and is re-suspended in the gases until it reaches the final stage, from which it discharges into the kiln through the kiln feed pipe. The repeated suspension and collection of the material is an arrangement for maximum contact time between the hot gases and material, resulting in high heat recovery.

The Suspension Preheater, as it is called, is a development of Klockner-Humboldt-Deutz AG, of Cologne, Germany. It was first installed at the plant of Norddeutsche Huette at Oslebshausen, Germany, and there are now seven similar installations in operation in cement plants. Four additional preheaters are under construction.

The Allentown installation is the first in North America and was designed and manufactured by Fuller Co., Allentown, Penn., Humboldt's licensee for the United States, Canada and Mexico. An entire new installation, including a new rotary kiln designed to operate with the preheater, is now being erected in an eastern U. S. plant.

The installation of Allentown Portland Cement Co. is on an 8- x 125-ft.

Key*†	Starting Date	Kiln Capacity Before Preheater Bbl./Day	Kiln Capacity With Preheater Bbl./Day	B.t.u./Bbl. of Clinker Before Preheater	B.t.u./Bbl. of Clinker With Preheater	Temp. of Mat'l. From Pre-heater °F	Type Raw Material	Old or New Kiln	Kiln Size	Kiln Slope	Kiln Speed r.p.h.	% Capacity Increase	% Fuel Saving
1.	Nov. 1950	840	1200	995,000	661,000	1500°F	With 15-35% Slag	Old	8'-3" x 133'	5/8"	50	42.8%	33.3%
2.	April 1953	1250	1782	925,000	620,000	1238°F	Lime Marl	Old	9'-0" x 197'	3/8"	60	41.4%	35.2%
3.	May 1953		2058		615,000	1300°F	Lime Marl	New	10'-6" x 133'	7/16"	60	New Kiln	New Kiln
4.	May 1953	900	1380	962,000	660,000	1317°F	Limestone, Clay	Old	8'-6" x 164'	7/16"	66	52.4%	31.2%
5.	April 1954		2280		613,000	1470°F	Lime Marl	New	10'-6" x 133'	7/16"	72	New Kiln	New Kiln
6.	May 1953	860	1500	1,100,000	650,000	1432°F	Limestone, Cement Rock	New	8'-0" x 125'	5/8"	90	74.0%	41.0%
7.	May 1954	780	1200	995,000	650,000	1350°F	Limestone, Clay	Old	8'-3" x 164'	3/4"	36	53.8%	34.7%

*1. Norddeutsche Hutte, Bremen-Oslebhausen. 2. Portland-Zementwerke, Anneliese-Ennigerloh/Westf. 3. Bomke u. Bleckmann, Beckum/Westf. 4. P.Z.W. Heidelberg AG Werk Burglengenfeld. 5. Portlandzementfabrik Hardegsen AG, in Hardengsen. 6. Allentown Portland Cement Co., Evansville, Penn. 7. "Terni" Societa per l'industria el'Elettricita cemente ria, Spoleto, Italia.

†Coolers in all plants are Fuller type.

rotary kiln with 6-in. lining. Capacity of the kiln has been increased from 860 up to 1500 bbl. of clinker per day and fuel consumption has been reduced from 1,100,000 B.t.u. per bbl. to about 650,000 B.t.u. This performance is an all-time record for thermal efficiency in an American cement plant. Production and fuel economy will undoubtedly be improved with installation of increased exhaust fan capacity to permit greater use of the gas stream.

The figures given are average data and have been accomplished while using but 60 percent of the total gas stream.

Fuel Economy

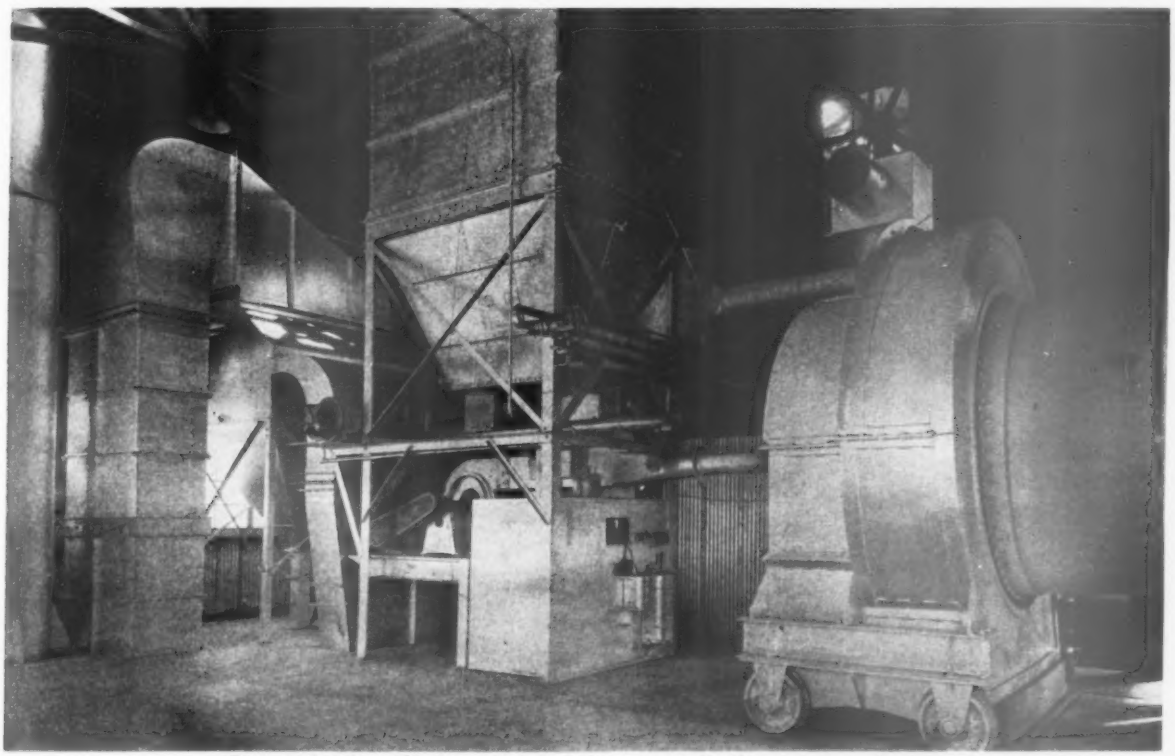
Average results from seven installations, as tabulated herewith, indicate comparable fuel efficiency for kilns of different proportions and using various kinds of raw materials. However, there has been no attempt in the European installations to achieve peak production of the order at Allentown's plant.

At Evansville, the design of the layout, which is illustrated herewith by elevation drawing, is essentially the same as that in the original German installation. However, the method of operation has been changed to meet the requirements of the American cement manufacturer which differ from the principal objectives in Germany. With $18 per ton coal in Germany, high thermal efficiency is the main objective, and it is the high cost of fuel that led to development of the Suspension Preheater.

In the United States, rising fuel costs are a factor in plant design and operating methods but labor is the principal item of cost and high rates of production are the goal in seeking to hold down unit costs. Accordingly, the Suspension Preheater of Allentown Portland Cement Co. has been adapted to accomplish both objectives. The kiln has been stepped up to a speed of 90 r.p.h., 50 percent over the previous figure, with about 74 percent increase in feed rate, and a remarkable thermal efficiency is being obtained under forced firing conditions.

Raw material at Evansville is an argillaceous limestone of the Lehigh Valley type which is blended with high grade limestone, and sometimes iron oxide, to correct the mix. The grind for standard portland cement is to a fineness of 90 percent passing the 200-mesh sieve. Raw material contains no binding material and is too unplastic to be nodulized for preheating by any other means.

The 8- x 125-ft. rotary kiln, Humboldt Suspension Preheater and a 6-



Firing end of 8- x 125-ft. rotary kiln which is operated with suspension preheater

x 22-ft. Fuller inclined grate clinker cooler comprise the basic operation. The kiln is fired by a mixture of anthracite coal, bituminous coal and oil, and burning is carried right up to the nose ring for maximum air-quenching of the clinker over the cooler.

Operating Details

The preheater, as shown in the accompanying elevation, comprises a raw material supply bin, a series of four cyclone collector stages with connecting gas ducts, a dust collector, exhaust fan and stack. Exit gases from the kiln are drawn up through a vertical duct with an opening into the fourth stage of the preheater. Similar ducts deliver the gas to the third and second stages, from which the gas stream is split to two smaller diameter cyclones identified on the drawing as stage No. 1. Stages No. 2, 3 and 4 have 9-ft. 10-in. inside diameter cyclones and the stage No. 1 cyclones are 5 ft. 3 in. to increase the speed of flow for higher collection efficiency. Gases from stage No. 1 are drawn by the induced draft fan through a multiclone-type mechanical dust collector consisting of four rows of the cyclones, to exhaust into the stack. All duct dimensions were designed to provide the necessary velocity, at the temperatures involved, to suspend the material and raise it vertically to the cyclones.

A Fuller-Kinyon pump delivers material into an overhead supply bin. Raw material is continuously supplied the system by a Fuller Airlift-Constant Head Feeder. This feeder is independent of the kiln drive but it is calibrated and its speed may be changed on the operating floor.

It will be noted from the accompanying sketch that several alternate methods have been provided to introduce the feed into the preheater, and that there is provision to by-pass the preheater entirely. Also, a by-pass flue was provided so that all, or any proportion, of the kiln gases can be diverted directly to the stack. This was done for experimental purposes to determine optimum conditions in taking the maximum available heat coming from the kiln and introducing as much feed material as possible to extract the available heat.

Early operation was confined to the use of the kiln and clinker cooler, without the preheater in service, as part of the study necessary to determine the possibilities of the preheater. All kiln gases were then exhausted to the stack which, with the by-pass flue, were designed especially for the preheater operation.

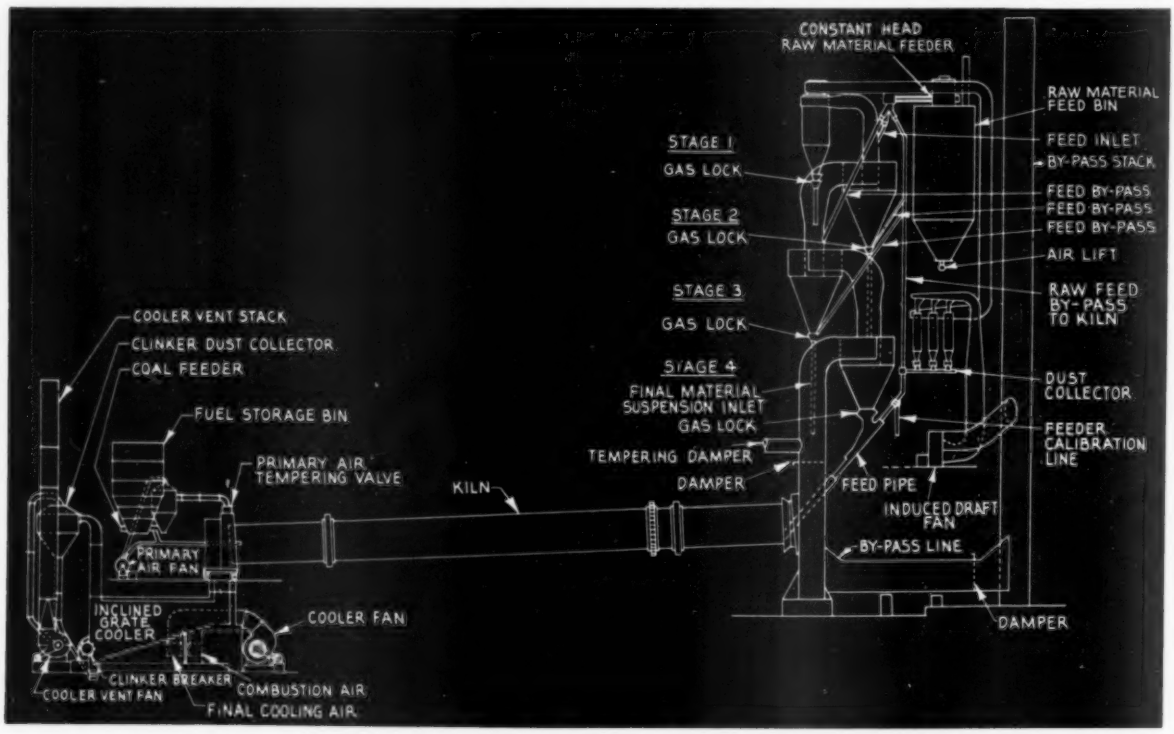
At first, the feed material was discharged into the duct leading from stage No. 2 to stage No. 1 at a point near the bottom of the duct. After separation in stage No. 1, the collected material passed through balanced gates and was conducted into the gas duct between stage No. 2 and stage No. 3, at a point just above the discharge openings of stage No. 3 (see page 71).

Stages No. 2, 3 and 4 are essentially alike, and the material is alternately suspended and collected, to finally discharge from stage No. 4 into the kiln feed pipe. The flow through requires about 20 seconds.

Dust exhausted from stage No. 1 is collected in the cyclone-type dust collector and the cleaned air is exhausted to the stack. Collected dust is conveyed by four parallel enclosed screw conveyors to left and right hand collecting screws, transferring into the kiln feed spout. Dust amounts to about 5 percent of the total kiln feed and its temperature averages 245 deg. F.

It has not been practical thus far to preheat the dust in this particular installation due to mechanical restrictions; otherwise, the dust would be introduced to the vertical duct between the end of the kiln and stage No. 4. This change is to be made since the relatively cool dust dilutes the temperature of the total kiln feed stream by about 50 deg. F. upon entry into the kiln feed pipe. Thus, further reduction in use of fuel may be accomplished by this change.

After exhaustive experimentation and testing, the feed material is now being introduced in the duct between stages No. 2 and 3. This arrangement permits stage No. 1, into which some of the material is drawn, to be much more effective in the collection of dust. Total dust lost in the exhaust stack is about 2.5-3.0 percent, of which the



Arrangement of suspension-type preheater as installed at Allentown Portland Cement Co. plant

larger part is that carried by the by-pass air.

The entire preheater structure totals about 108 ft. in height and the feed supply bin is high up in the structure in this installation, only because space was limited and there was no other place to put it. In installations where space is adequate, the supply bin would be at ground level. All cyclones and ducts are aluminum-painted and those below stage No. 1 are lined with 5- or 6-in. thick cast refractories. Temperatures around the installation are surprisingly low. Surface measurements on the outside of the steel indicate an average temperature of 250 deg. F., with 500 deg. F. for the non-insulated cyclones of stage No. 1. The structure around is in process of being partially enclosed.

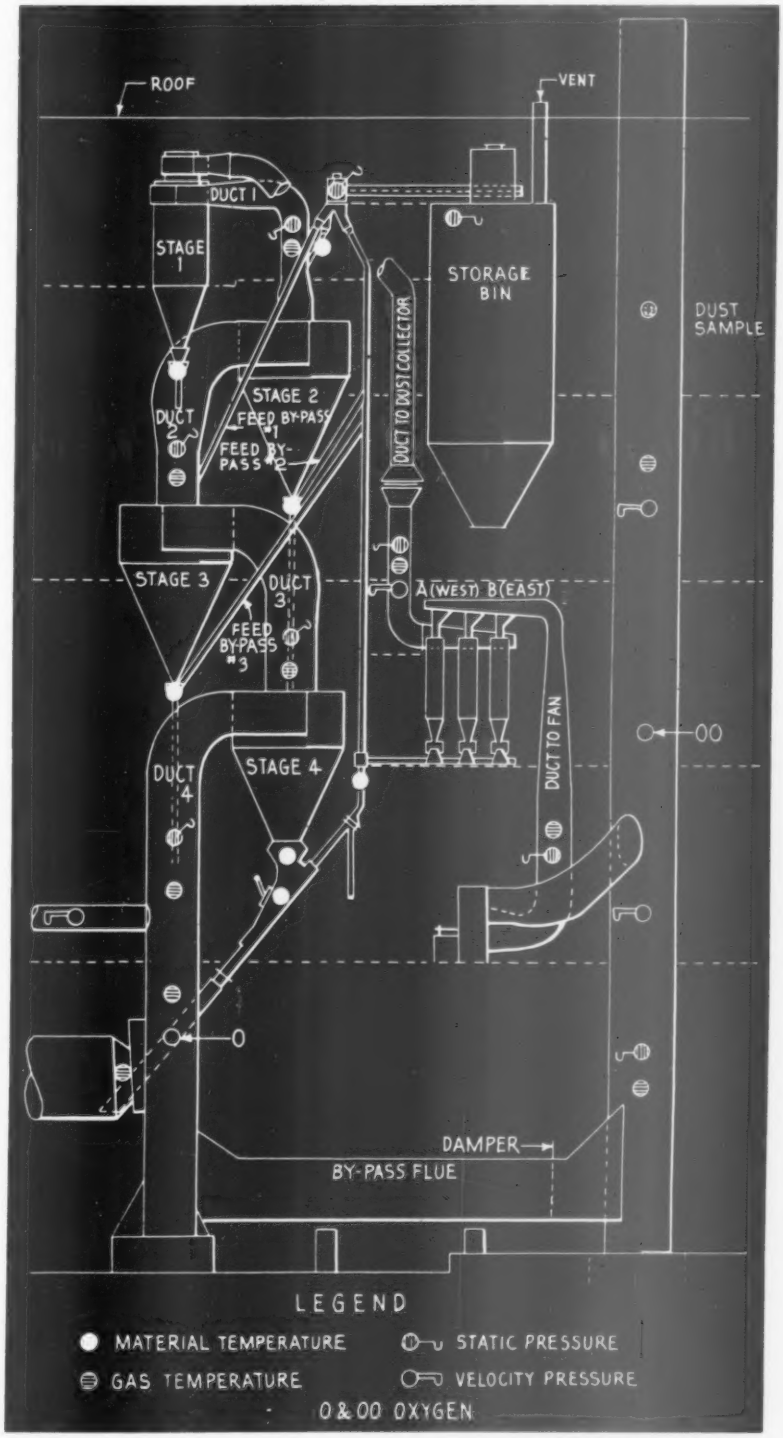
This is a tight system to prevent air leakage, and the rear-end ring of the kiln has a tight seal to minimize air leakage at that point. The end ring is kept cool by a continuous forced air blast as a precaution, because rear-end kiln temperature is higher than ordinary due to being fed highly preheated material.

Temperature of the material coming from stage No. 4 outlet to the kiln feed pipe is averaging approximately 1400 deg. F., and it is of interest that the temperature of the gas at that point is never more than 100 deg. F. higher. As already stated, there is a sacrifice of about 50 deg. F. in the temperature of the material entering the kiln feed pipe due to inter-mixing with 5 percent unpreheated dust.

Temperature of the gases at the outlet of the kiln is 1800-1900 deg. F., which compares with 1500-1600 deg. F. before the preheater was installed. The high heat recuperative efficiency of the system is evident from the exit gas temperature which averages about 420 deg. F. This figure could be brought even lower by the use of additional suspension stages, if desirable.

The induced draft fan was designed for much lower kiln output and thus has limited the ability to utilize more of the total heat carried by the kiln exit gases. It is driven by a 125-hp. motor and is running up to its limit, in drawing 20,000 c.f.m. of gases through the system. This is only 60 percent of the total air. A larger fan is to be installed shortly and it will then be determined just how much material may be fed the kiln through the preheater. With installation of the new fan, a damper will be provided in the duct just ahead of the dust collector as a means to hold the temperature below 600 deg. F. It is very likely that this change, along with preheating of the returned dust, will result in substantially greater thermal efficiency and, undoubtedly, the kiln will produce more than the 1500 bbl. of clinker per day now being obtained.

As we stated earlier, the kiln is being turned at the relatively high speed of 90 r.p.h. Feed is being maintained to hold about the same bed of material in the kiln, as formerly carried at the lower kiln speed. As fed into the kiln, the material is approximately 20 percent calcined. Thus, the kiln's function in making clinker is to complete the calcination, starting right at the feed end, and burn the material into clinker. Retention time through the kiln is 45 min.



Diagrammatic sketch showing test point locations for suspension type preheater at Allentown Portland Cement Co.

Firing temperature is 2700 deg. F. as measured on the lining at the firing end of the kiln. The lining of the kiln did not require change. Combustion is regulated to hold O_2 to within ½-1½ percent as measured by continuous oxygen analyzer. Draft required through the system is in the range of 22-25 in. w.g., but this sacrifice in power is much more than offset by savings realized through grinding far less coal.

All of the preheater cyclones and ducts are of ordinary black steel with the exception that stainless steel is used at the discharge from stage No. 4 and at some of the restrictive points. The kiln feed pipe is subjected to temperatures so hot that it has a red glow. It is of stainless steel for the section leading into the kiln and the projected length is water-cooled.

As far as operation is concerned, there are no moving parts to the preheater except for the fan. After a continuous year of operation, there is no visible sign of wear in the cyclones. No extra men are required for its operation. During the year of experimental but nevertheless full-scale production, the instruments for control have been centralized on the kiln feed-end level but only because the installation was under continued study. Future installations would have the preheater control instruments on the kiln burner floor. Instruments that have been required are draft gauges, and temperature recorders for the material and air streams at various points in the system. These points are indicated on the drawing reproduced herewith. Speed of the feed screw is set on the operating floor but that adjustment can be accomplished as well at the kiln burner floor.

It was anticipated that materials might have a tendency to stickiness that would result in plugging in the collector discharge points, and possibly that calcination in the preheater would prove undesirable. Accordingly, a tempering valve was provided to admit air into the kiln exhaust duct for temperature control, but it has not had to be used. Some tendency to plugging in the discharge from stage No. 4 was experienced but that was corrected by increasing the diameter of the balanced gate and could easily be corrected at any other point, should the condition arise. Occasional secondary combustion in the preheater, and calcination, have presented no operating problems.

It will be noted from the accompanying table summarizing average operating data in seven installations, that many different types of raw materials, including various limestones, marl, slag, shale and clay, are being successfully preheated and that operating results are uniformly favorable for all the materials used. Apparently, the process is mechanically adaptable to any cement raw material.

Clinker Quality

Quality of the resulting clinker has been carefully tested. There has been no measurable segregation of minerals either because of particle size differences or because of variations in specific gravity which it was expected might possibly occur because of the calcination of carbonates in the lower stages of the preheater. Apparently the repeated collection and suspension have contributed to maintenance of the raw material blend.

It was not found necessary to return the dust collected into the raw feed to the kiln. As far as alkalies are concerned, the fact that the gases are discharged at a temperature below the condensation temperature for alkalies has not proved detrimental. Total alkalies present in the clinker have run but slightly higher than for other kilns of comparable size in the plant using the same raw material, so it was not required to discard the dust of highest alkali concentration. Clinker from the kiln with the preheater, compared with the other kilns in the plant, has lower free lime content and better density. High early strength cement and special tested cement for the Pennsylvania Highway Department as well as standard portland cement are being ground from clinker produced by the kiln with preheater.

The process, based on Allentown Portland Cement Co.'s experience, would be adaptable to stepping up markedly the thermal efficiency and output of many of the short dry process rotary kilns in the cement industry. Four stages of collection and suspension may not be required for thermal efficiency, depending upon the kiln exit gas temperature, and likely not for long, dry process kilns. However, the use of four stages would result in discharging gases at temperatures very favorable to the efficient operation of electrical precipitators. The practical fuel burning capacity of existing kilns, if adapted to this form of preheating, would be the only limitation to productive capacity.

Outstanding Safety Record

KAISER ALUMINUM & CHEMICAL CORP.'S Natividad, Calif., limestone quarry has received the top award of the Joseph A. Holmes Safety Association for national leadership in the mineral industries' accident prevention program, presented by the U. S. Bureau of Mines. The award was the fourth received by the quarry from the association.

Slag Production Sets Record

The iron blast-furnace slag industry set a new record in tonnage processed in 1953, as reported by the Bureau of Mines. The output in 1953 was 30,511,603 short tons, valued at $40,067,294, compared to the 1952 output of 26,899,376 short tons, valued at $33,874,209. These statistics were compiled from a survey conducted by the National Slag Association in cooperation with the Bureau of Mines. Included are the outputs of 45 companies operating 68 plants processing air-cooled slag, 16 plants processing granulated slag, and 20 plants producing expanded slag. The record tonnage reported was said to be due to the heavy demand for slag as a mineral aggregate, coupled with an uninterrupted supply of raw material during the year.

Aggregate Use Increases

Screened air-cooled slag, the major product, increased 14 percent to 21,021,624 short tons, valued at $32,677,948. Of this total, 21,349,845 tons (89 percent) were used as railroad ballast, or as aggregate in portland cement concrete construction, bituminous construction of all types, and miscellaneous highway and airport construction. Other principal uses were in the manufacture of concrete block, mineral wool and roofing.

The production of unscreened air-cooled slag totaled 845,311 short tons, valued at $581,083, representing decreases of 38 and 22 percents, respectively, compared to the 1952 figures. About 63 percent of the output was used as aggregate in highway and airport construction, 1 percent as railroad ballast, and the remainder in unspecified miscellaneous uses.

The output of granulated slag amounted to 3,358,910 short tons, or a 34 percent increase over 1952 production. Of this quantity, 42 percent was used as a raw material in hydraulic cement production, 39 percent as road fill, and the remainder for concrete block production, agricultural slag and liming, and miscellaneous uses.

Expanded slag production set a new record of 2,285,758 short tons valued at $5,557,813. Output and value were 16 and 21 percent higher, respectively, than in 1952. The bulk of this material was used in production of lightweight concrete block.

Iron blast-furnace slag is produced in 15 states, with most of the production coming from the steel centers of Ohio, Pennsylvania, and Alabama. As in the past several years, Ohio was again the largest producer. The recovery of iron by slag processors during 1953 totaled 353,833 short tons, compared to 351,774 short tons in 1952.

CONTROL Toxic or Combustible Gases, Dusts or Vapors

• Intermittent hazards to workmen from gases, vapors or dusts can be most efficiently corrected by using potrable ventilation

Delays are reduced, when a cement kiln is shut down for repairs or maintenance work, by use of the air-moving device to cool kiln and remove residual gases or fumes

WHEN TOXIC OR COMBUSTIBLE GASES, dusts or vapors are encountered either continuously or at regular intervals in a plant, the danger is readily apparent and fixed ventilation equipment can be used to keep the air clean and safe. But when such gases or vapors or dusts occur only "now and then" the hazard is more difficult to appreciate and to combat.

A practical solution to this problem has been developed through preventive technique* by taking "portable ventilation" to points of potential trouble where they are too numerous and yet too intermittent in occurrence to merit installing permanent exhausters or blowers.

Standard procedure is to gas-free these locations before and during a maintenance job, by use of MSA-Lamb "Air Movers," lightweight and portable devices designed for rapid movement of large volumes of air. The air movers operate on compressed air or steam, have no motors or moving parts, and can be easily carried by one man from job to job.

In the boiler house, during shutdowns for maintenance or repair work on shell, drum, tubes, burners or furnace parts, use of the "portable air" technique not only protects employes but also saves valuable time. Men can move in more quickly and safely because the air movers can gas-free and cool the boiler and furnace far more thoroughly and rapidly than by the "natural cooling and hope-so gas-freeing method."

*Developed by Safety Supervisor James J. Padovese, Pittsburgh Coke & Chemical Co., Neville Island, Penn.

One of the "air-movers" placed over service entry to ball mill with a compressed air line coupled to it for ventilating mill before workers enter to burn out old zinc

The air movers operate on the venturi principle, engineers of Mine Safety Appliances Co., the manufacturer, explain. Either compressed air or steam is admitted to the bell and enters the horn through an annular orifice around the base. As it passes through the horn its expansion induces a rapid flow of outside air, equal to approximately ten times its own volume, through the outlet horn.

Explosive hazards are lessened, because there are no moving parts or motors. Initial cost of the air movers is said to be low, usually about one-tenth that of blower and exhauster of comparable capacity, and upkeep is simple because of the absence of moving parts. Their weight ranges from 6½ lb. for the 3-in. model up to 43 lb. for the 10-in. model.

At a cement plant, the same approach solved two safety problems. The cement kilns, during shutdowns for periodic relining or for repair work, could be dangerous to maintenance crews because of residual coke oven gas, or because of carbon monoxide that might concentrate in the kilns as a result of imperfect combustion of powdered coal, the alternate fuel. The air movers quickly and thoroughly exhaust contaminated air from the kilns.

In the ball mills, which finish-grind clinker, workers burn out the old zinc and replace it with new. Fumes from the zinc or the torches, or both, could not be tolerated. The ventilating devices, accordingly, now are positioned

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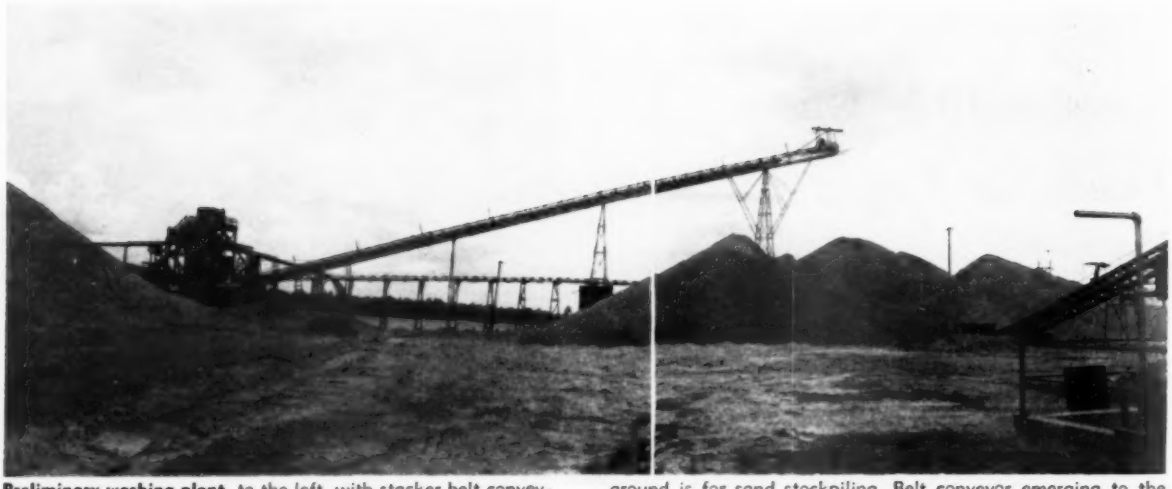

Preliminary washing plant, to the left, with stacker belt conveyor for surge pile, to the right. Horizontal belt conveyor in background is for sand stockpiling. Belt conveyor emerging to the extreme right inclines up to final screening plant

How One Sand and Gravel Company Met the DEPLETION PROBLEM

• Gifford-Hill & Co. plant near Kinder, La., illustrates the more costly recovery operations required to supply aggregates when older and more easily worked deposits are exhausted

By WALTER B. LENHART

ONE OF THE NEWER OPERATIONS of the Gifford-Hill & Co., is the Indian Village plant located near Kinder, La. This plant could be used as an example of the measures required to secure adequate sand and gravel in the Gulf Coastal areas since over the years the more easily operated deposits gradually have become exhausted. Producers must work less attractive deposits which in this case require handling heavy overburden to obtain smaller amounts of gravel.

Kinder, La., is in the south central part of the state about 40 miles north of Lake Charles. Important sand and gravel deposits farther north in the Alexandria area have been exploited for years. Lake Charles is a rapidly growing city with resources based on oil and oil refining, chemical industries related to oil and its by-products, and the availability of cheap oyster shells as a source of lime. Cheap water transportation and year-around climate are important regional resources to say nothing of the air bases of considerable magnitude. Kinder, La., is its nearest source of commercial aggregates other than oyster shells.

Truck loading bin installation of unique construction

Strip Heavy Overburden

During September, 1952, stripping operations were started at the Indian Village site, and for the next 12 months about 500,000 cu. yd. of material were removed. Overburden comprises mainly a clay through which occasional lenses of sandy loam are found. The strippings are hauled to a "lean" portion of the area where they are dumped. Two 15½-cu. yd. Euclid scrapers, powered by 275-hp. Cummins diesel engines with an assist from an HD-20 Allis-Chalmers tractor equipped with a pusher blade, do the stripping and hauling to the disposal area. This distance is about ½ mile.

Left: Final screening plant. Belt conveyor to right is from surge pile. **Right: 84-in. dia. concrete** pipe for belt conveyor tunnel

At the disposal area, the Euclid scrapers move up a dirt ramp to a point near the rim and dump. Scattered piles of this debris are then pushed over the rim by an HD-15 Allis-Chalmers tractor and dozer. When the pile has reached its optimum length a new bed of material (or layer) is started so that the pile is essentially a large dirt ramp. An AD-40 motor grader keeps the road and area about the section being stripped in a good condition for the Euclid scraper to travel over. Overburden averages from 30 to 40 ft., with the sand and gravel deposit ranging from 30 to 50 ft. in depth.

Dredging Operation

Most of the commercial material is below water so a 10-in. counter-flow Amsco pump powered with a 400-hp. electric motor does the primary digging. The deposit is relatively loose so no cutter is used on the suction head. A 40-hp. motor operates the Clyde hoist used to raise the suction head and to move the boat. The gravel is all relatively small and the amount of plus 2-in. is nil. The deposit is approximately 35 percent plus ¼-in. and 65 percent minus ¼-in.

The new dredge is mounted on five pontoons of ⅜-in. steel plate with a deck plate of ¼-in. steel. Each rectangular pontoon is 10 x 30 ft. and 5 ft. deep. They are held together with 1-in. bolts and steel rails welded across the bottom. Each pontoon has three compartments. The suction line and assembly is supported on two cylindrical pontoons, each with the suction line between the two cylinders. Power for the plant and dredge is purchased from the Central Louisiana Electric Co., and delivered to the plant at 33,000 volts. The 400-hp. motor on the dredge is a 2300-volt unit; other motors are 440-volt. The dredge, which has a 65-ft. suction, is provided with a gantry crane running from the front and extending 10 ft. over back end to handle dredge parts. The dredge was named the "Kay" after the granddaughter of J. Rutledge Hill, president of Gifford-Hill & Co., Inc.

The plant, which is modern in every respect and designed by John R. Hill, chief engineer for Gifford-Hill, embodies ideas derived from many years of operating and engineering experience. It is a push-button plant, using Square D electrical controls and Louis Allis gear head motors for the most part. The main field offices for the operation are in Alexandria.

The plant is divided into two sec-

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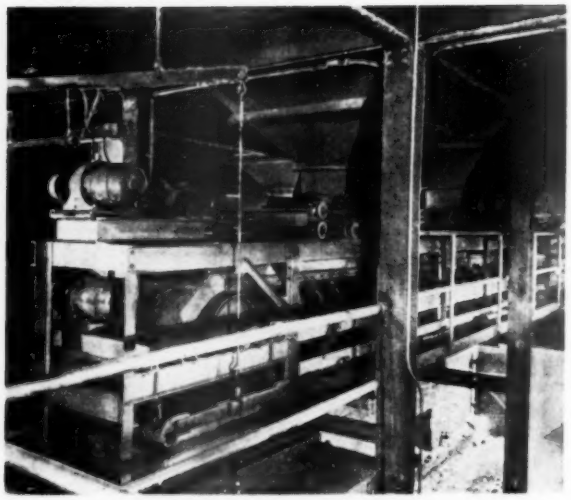
Above: A 10-in. counter-flow pump and hoist are principal items of equipment on dredge. No cutter is used. **Below: Scraper** assisted by tractor removes overburden

Storage bins discharging coke and slag by reciprocating feeders to belt conveyor (Fig. 1)



Belt conveyor delivering load to weigh hopper, lower left, automatically stops when pre-set weight is delivered (Fig. 2)

CONVEYOR SYSTEM

Cuts Rock Wool Cupola Charging Costs

• American Rock Wool Corp., South Plainsfield, N. J. installs automatic weigh batching and charging system to assure greater accuracy and speed up operations

A NEW MECHANICAL HANDLING SYSTEM to replace a wheelbarrow operation for conveying coke and slag from storage bins to cupolas was recently installed by the American Rock Wool Corp., South Plainfield, N. J. Steel mill slag is the raw material used in the production of rock wool; coke is the fuel used in processing the slag. The new system, constructed by the Gifford-Wood Co., cuts work-hours by 66 percent, eliminates a burdensome manual operation and decreases the possibility of erroneous charges. One man can handle approximately 250 tons per shift.

Incoming coke and slag are delivered to the plant by rail and are carried by truck from the railroad siding to storage. The trucks haul the materials up a ramp and dump them into 12 bins, arranged in four rows of three each.

The Gifford-Wood system then conveys the slag and coke to the cupolas. The system comprises:

(1) Twelve reciprocating feeders, one at the base of each bin (Fig. 1).

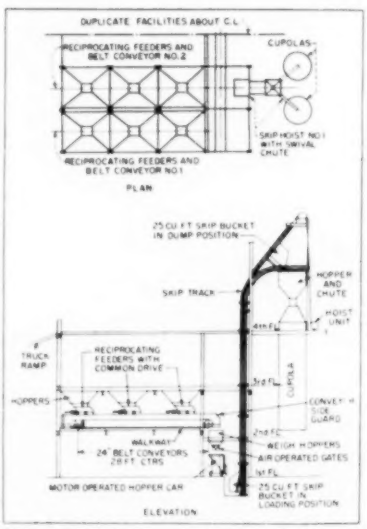
(2) Four belt conveyors, one beneath each row of bins (Fig. 2).

(3) Four weigh hoppers, one at the delivery end of each conveyor (Fig. 2).

(4) A rail-mounted transfer car which travels beneath the weigh hoppers (Fig. 3).

(5) Two skip hoists, located alongside the transfer car tracks (Fig. 4). Each skip hoist charges two cupolas.

The reciprocating feeders deliver material to the belt conveyor in an even stream, each belt receiving material from three feeders. Feeders delivering to a given belt are driven by a common motor and may be disengaged from the drive mechanism so that one, two or three bins in any one row may be discharging at a given time.



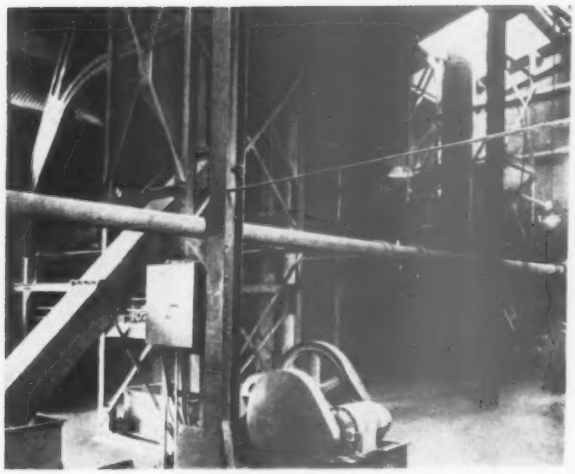
Schematic diagram indicates layout of slag and coke handling system

Each belt conveyor delivers to an individual weigh hopper which operates automatic controls to stop the belt when a pre-set weight has been delivered. Slag hoppers (three) are set for 1000 lb.; the coke hopper for 300. Hoppers store their contents until called for by the transfer car.

Push-Button Controls

The transfer car is divided into two compartments and can receive material from any of the four hoppers. The operator positions the car under a given hopper and actuates a compressed-air valve to open the clamshell hopper gate, allowing the contents to flow by gravity into the car. After he has closed the gate, he pushes an electric button starting the conveyor which refills the hopper. He operates the car by push-button controls, an

Transfer car receives loads from weigh hoppers and delivers to buckets of skip-hoists. Car divided into two compartments (Fig. 3)



Two skip-hoists supply materials to four cupolas. Bucket of skip-hoist, to left is in discharge position; chute conveys charge from hopper to cupola (Fig. 4)

electric motor furnishing the power. The motor is mounted on the car, electricity being supplied by a sliding cable.

The transfer car discharges into the bucket of either of the two skip hoists. The operator spots his car in position and releases a lever which opens the hinged front of the car and allows the contents to flow by gravity into the skip hoist bucket. The bucket then travels vertically upward along angle-iron guides and upends into a hopper serving chutes leading to either of two cupolas. A motor-driven drum located near the top of the skip-hoist structure winds and unwinds a cable which raises and lowers the bucket. Push-button controls are located at the base of the structure, near the loading point. When one cupola is being charged, the chute to the other is closed.

In operation, a light goes on at the base of one of the skip hoists when the charge within a given cupola falls below a certain level. At this signal the transfer-car operator begins to replenish the charge. He first fills the skip-hoist bucket with coke and pushes the button which empties it into the cupola. When the bucket returns he fills it with slag and again sends it to the cupola. He then sends up a second load of slag to complete the charge.

While waiting for the next light to go on, the operator fills the two compartments of the car, one with coke and the other with slag. Thus, when a light does go on, he can start replenishing the charge at once and can pick up the second load of slag from the nearest hopper as the load of coke or first load of slag is being delivered. Cupolas require charging approximately every 25 min. This schedule gives the operator the necessary time to load the skip hoists and keep his production record forms. One man operates the entire system.

Under the old system, bins were of somewhat different construction and material was shoveled into wheelbarrows, much as home coal bins are emptied. The wheelbarrows were then pushed over to the cupolas and the contents dumped in.

Depletion Problem

(Continued from page 75)

tions with a surge pile between the two units. The first section receives the pulp from the dredge over a stationary screen. The plus fraction going to a 25-cu. yd. bin under which is operated a 24-in. stacker belt, 250-ft. centers, for the surge pile. The material is all plus ¼-in. The stacker belt is 74 ft. from ground level to bottom of the head pulley, and holds 40,000 cu. yd. of semi-finished material.

The minus ¼-in. material flows to sand settling boxes over which is a stationary screen that is changed to make the two sizes of sand, masons and concrete. Sand is not important in the area so refinements in its recovery are unnecessary. As the tonnage required is relatively small, the balance of the sand from the stationary screen is wasted. Under the surge pile is a reclaiming tunnel made of reinforced 84-in. dia. concrete pipe made by Gifford-Hill at their Minden, La., plant. The tunnel is 108-ft. long. In the reclaiming tunnel is a 30-in. belt conveyor served by five reclaiming gates. This belt delivers to the all-steel washer and sizing unit which is the second section of the plant.

C. E. McNair, plant manager

The washing section is built over six 85-cu. yd. capacity steel cylindrical bins. On top of these bins are two Robins Eliptex triple-deck vibrating screens. The first is a 4- x 12-ft. unit and the second is a 5- x 14-ft. Between the two screens is a short belt conveyor. Plus 2-in. from the top deck of the first screen is nil. The bottom deck is a de-watering unit. Intermediate sizes go to the belt conveyor and are delivered to the second screen where normally a 1¼-in. to ⅝-in., a ⅝-in. to $\frac{3}{16}$-in., and a $\frac{3}{16}$-in. to No. 8 are prepared. However, all state, local and federal specifications can be met. A 6-in. pump delivers water from the pond to the sizing screens. All electric wiring about the plant is in steel conduit buried well below ground.

Under the six steel silos is a second reclaiming tunnel and it too uses 84-in. dia. reinforced concrete pipe. The 30-in. belt conveyor delivers to four steel truck bins. The belts are all Hewitt-Robins as well as the carrier and return rolls.

The company has 1000 acres at the Indian Village site which is gravel bearing as well as other acreage in the immediate area. C. E. McNair is plant manager, and J. Howard Wilson, Alexandria, La., is vice-president for all Louisiana operations.

Two 8- x 125-ft. kilns for production of expanded lightweight aggregate

• Rescolite Co., Fort Smith, Ark., operates three kilns in processing shale into aggregate. Shale is excavated with tractor and ripper followed by scraper loader which carries it to preliminary crusher at the site

By TIP BROWN

Make Lightweight Aggregate from Shale

ONE OF THE NEWER producers of expanded shale lightweight aggregate, the Rescolite Co. plant at Fort Smith, Ark., presents an interesting study on design and processing.

The plant was developed after research and planning, and is unique in that it is part and parcel of an existing plant built in 1944 for the purpose of treating zinc-bearing materials for the recovery of zinc, which was at that time a critical item for defense purposes.

Two 8-x125-ft. Allis-Chalmers kilns and one 6- x 60-ft. Vulcan kiln are used in processing shale into aggregate. Expansion of existing facilities to complete the lightweight aggregate plant involved some $160,000 of new equipment. At present one of the larger rotary kilns is used for expanding the shale, and plant capacity can be increased as the need arises from the current installation.

The new lightweight aggregate plant began production in September, 1952, and has been in continuous production since, averaging 180 cu. yd. of finished material per day.

Raw Materials Handling

Existence of a large body of shale suitable for expansion purposes had been known for some time. Extensive core drilling and testing dictated the mining site which is located about ¼ mile from the plant.

The quarrying consists of a pit mining operation in which the shale is first wet down with a hose, allowed to weather slightly, and is then ripped up by a D-8 Caterpillar tractor and ripper. A 7-cu. yd. capacity scraper is used to transport the shale to a preliminary crushing plant on the site. The blue-black shale is crushed to minus 4-in. by an Eagle Senior double roll crusher which discharges to a belt conveyor serving the truck loading hopper.

Trucks transport the shale to the plant over a private road where it is fed by conveyors to the secondary crushing plant, consisting of a 36-in. Jeffrey hammermill and screening equipment. Here the shale is reduced to 100 percent passing ⅜ in., with 15 to 18 percent passing a 100-mesh screen. The shale in its final crushed state is elevated into steel storage tanks which accommodate approximately 1000 tons. Variable speed belt feeders are provided which discharge the kiln feed onto a system of belt conveyors and bucket elevators to the water cooled feed pipe projecting into the kiln.

Belt conveyor to carry finished lightweight aggregate to storage building

Manufacturing Process

The process of manufacture was developed as the result of research over the country and a decision was made to pre-size the raw material, which step eliminates the necessity of crushing the finished product. All crushing and sizing is completed before expansion, producing particles with an impervious outer skin sur-

rounding the vesicular interior. This insures high strength and very low absorption. All sizes down to pan have identical properties, and the amount of fine material is ample for all gradations. A uniform feed rate is maintained. Kiln temperature reaches 2000 to 2100 deg. F. in the hot zone. The 8- x 125-ft. kiln is fired by a Coppus fanmix burner using natural gas. The burning rate is about 20,000 cu. ft. of gas per hour at 18 p.s.i. pressure.

The finished material drops into and feeds through a 5- x 50-ft. rotary cooler which discharges onto a 50 ft. long steel pan conveyor. The material goes to a Hewitt-Robins screen which scalps off all material retained on a ⅜-in. clear opening screen. Very little scalping is required. Minus ⅜-in. material drops onto a long inclined belt conveyor which takes the product up to the final screening operation. A Sweco two-deck separator is employed here sizing the aggregate into three sizes; coarse, medium, and fine. Covered concrete storage bins provide dry storage for 1500 cu. yd. The three sizes of aggregate may be blended to suit individual customer's fineness modulus requirement or shipped separately.

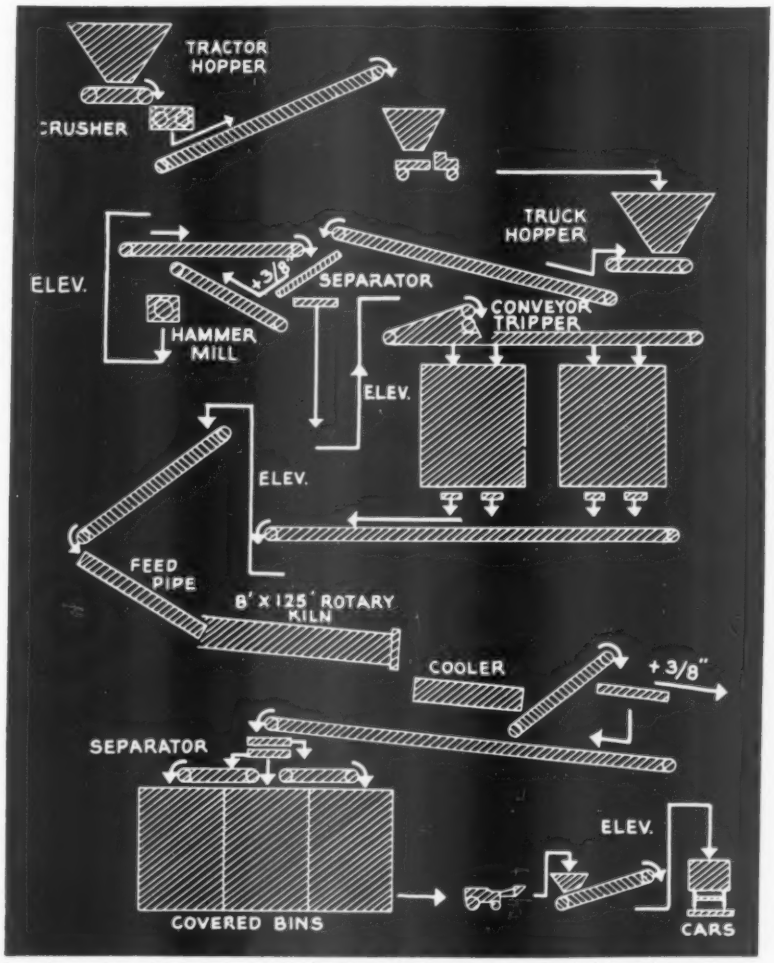
Showing two methods of loading finished products. To the left, conveyor and elevator for loading cars, and to the right, loading trucks with front-end loader

A Hough Payloader with ¾-cu. yd. capacity is used to transport the aggregate to a blending belt and elevator which discharges directly into railroad cars or trucks.

A series of tests conducted by private laboratories and College of Engineering, University of Arkansas, report this aggregate meets all requirements for structural uses.

The plant is served by the Missouri Pacific Railroad, and shipments are made into five states. Deliveries locally are made by truck. Expanding building operations in this section of the country give promise of widely increased use of this type of aggregate.

Officers of Rescolite Co. are Raymond F. Orr, president; Geo. T. Junkin, vice-president; A. K. Orr, treasurer; and Fred Ferguson, secretary. Others active in the orgnization are E. J. Walsh, plant engineer, and Chas. W. Alverson, sales engineer. Offices and laboratory are maintained at the p'ant site.



Flowsheet of crushing, screening, calcining, shipping facilities for lightweight aggregate

Controlling Toxic Gases

(Continued from page 73)

near-by before such work begins, and exhaust the fumes as they are created.

Safety men check the air before and after use of the air movers for any such ventilation-on-the-spot work in the boiler house, cement kiln or ball mill, using an MSA "Explosimeter" or MSA "Carbon Monoxide Tester." The former is a compact, lightweight combustible gas indicator, easily carried and simple of operation. The user, by setting a control and squeezing an aspirator bulb, can read on a meter the precise concentration of any combustible gas present, in terms of percentage of the combustible range. The CO Tester, weighing less than 8 ounces, gives precise readings of the amount of carbon monoxide present in the atmosphere.

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CLYDE MCMAHON has established a ready-mixed concrete plant at Big Springs, Texas. The plant produces washed sand and gravel and paving materials, as well as ready-mixed concrete.

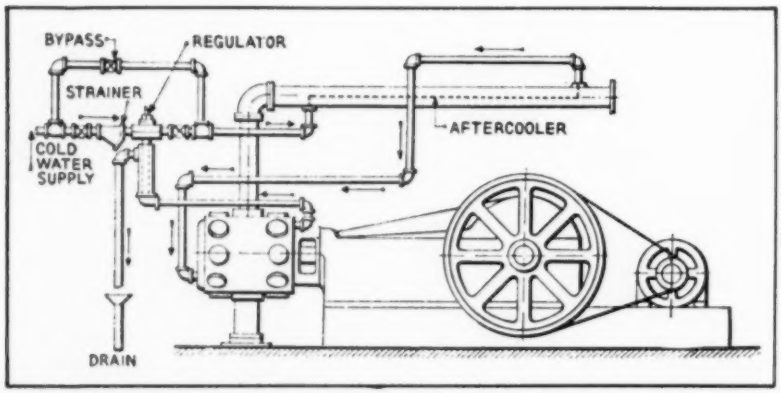


Fig. 1: Self-actuated regulator controls flow of cooling water to compressor jacket

Survey on Efficient Use of Compressed Air

By LEO WALTER*

COMPRESSED AIR is used for many purposes in mining, but not all compressed air systems work efficiently. A systematic survey of older existing compressor plants and piping systems will often bring to light poor operation, causing excessive cost per unit volume of air. Such a survey sometimes calls for the services of an expert, but it is important that management should be well aware of all the important factors which have to be dealt with. In the following, an attempt is made to explain certain fundamental factors, and to show the way in which improvements can be achieved.

Basic Considerations

Compressed air is attended by moisture precipitation within the piping system. Since water is always present in the atmosphere to a greater or lesser degree, depending upon the prevailing level of humidity, it follows that, the greater the throughput of air, the more the amount of water precipitated. It is seldom possible to ensure that compressors will be fed with moisture-free air, and the result is that some form of drainage must be provided from one or more points in the system where the water tends to collect. Hand-operated drain valves are all very well so long as there is someone to carry out the duty of opening them at appropriate intervals, but, often enough, this attention may be sporadic, and will almost certainly take little account of variable factors such as excessive humidity of the atmosphere or large increases in air consumption. Again, some compressed air installations are so extensive that one man may be unable to attend to the various drainage points owing to their distance or inaccessibility, and so local accumulations of water may develop and lead to unpleasant results either at the point concerned or further on. In order to overcome these difficulties a system of automatic drainage is desirable and, when this is correctly carried out, the elimination of water will be a continuous process requiring only occasional attention for inspection and cleaning purposes.

How to Start a Survey

A systematic survey should start with the compressor plant and its auxiliaries, then inspection of the pipelines, and end with examination of air consumption at the points of use. Wastage of air can have many causes, and may occur unnoticed for any length of time, unless some form of signal or alarm apparatus is applied, or unless continuous rate of flow measurement discloses abnormal air consumption. The fitting of "rate of flow" meters will help.

One of the major causes of waste is leaking joints in the pipework. Another is defective valves and pipe fittings and last, but not least, plant

(Continued on page 134)

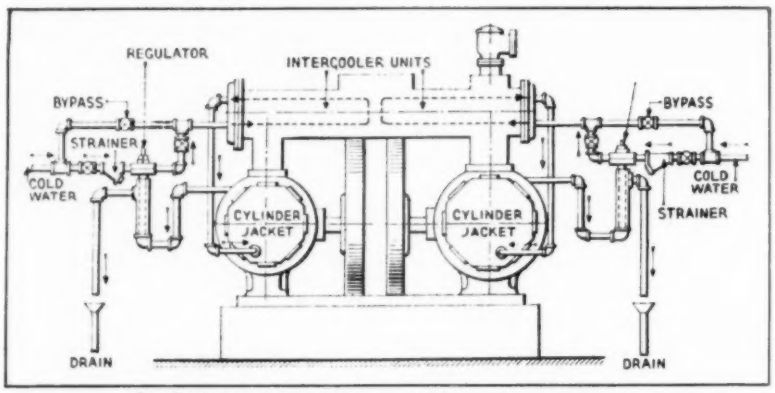


Fig. 2: Automatic cooling control of two-stage compressor

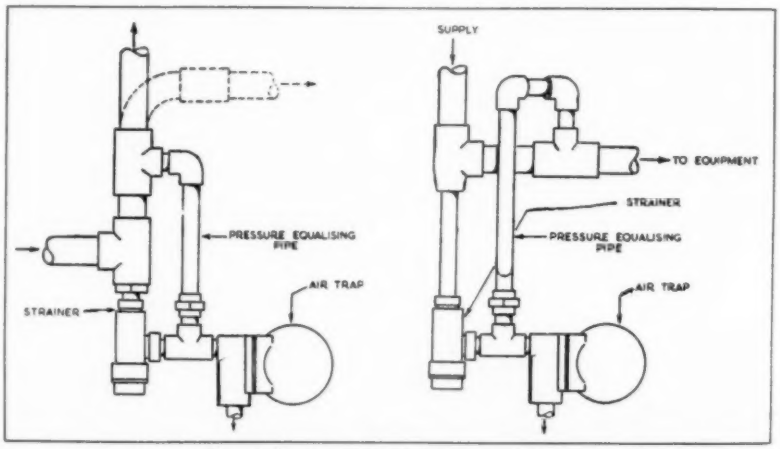


Fig. 4: Systems of draining vertical pipe

*Consulting Engineer, Cheltenham, England

Tire Expert C. M. Towner, mating square and tire gauge in hand, strides down line-up of trucks on his twice-monthly inspection

Forty Percent More Tire Life After Hiring Tire Expert

• Arrow Rock Co., Sun Valley, Calif., employs outside, independent expert to set up scientific program to check tires on 61 truck-trailers and transit mixer trucks

By JAMES JOSEPH*

AGGREGATE AND READY-MIXED CONCRETE producers of substantial volume employ from one to a half dozen men charged with the responsibilities for tire repair, inflation, emergency maintenance, and road calls. The question is, can these men really set up a scientific fleet-wide program geared to: (1) increase tire life; (2) cut road calls to minimum; (3) get the most from rolling rubber?

Arrow Rock Co., Sun Valley, Calif., believes that an outside, independent expert pays his way in supervising such a program. The figures speak for themselves.

With 61 truck-trailers and mixer trucks, this company is getting 40 percent more tire life over the same tire-bruising routes. Why? Because the company hired an expert, C. M. Towner, an old-time tire engineer and member of the Society of Automotive Engineers, for the job. He doesn't replace the tiremen's regular function, but merely lays out work to be done, and trains a regular staff in more scientific methods.

Arrow Rock Co. probably has upwards of 900 tires "on the ground." Considering that the average heavy-duty tire costs $120 (with tube), this means the company's fleet rolls on about $108,000 worth of rubber. That's a tremendous — and vulnerable investment. And only a small percentage increase in wear is sufficient to send tire replacement bills climbing. A five percent annual carcass loss (through premature blow-outs, injured treads, faulty inflation or poor recapping) means a loss of $6000. As road calls are estimated to cost the company $100 per call, a substantial saving can be made by reducing them to a minimum.

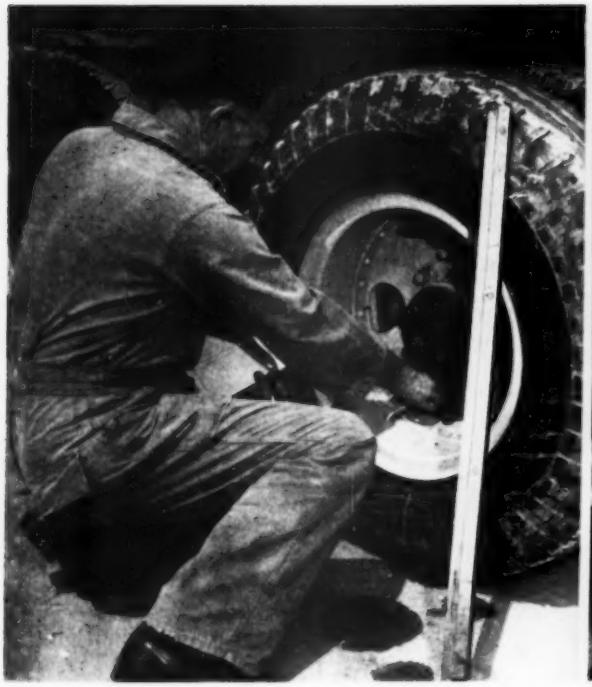
Haulers in this industry operate under highly unfavorable off-the-road conditions. Tires fall prey to roofing nails, reinforcing bars, jagged timbers, and sharp stone.

Mr. Towner's first move was a complete fleet appraisal, involving about six months of study. His immediate job was to determine the correct inflation for the fleet — and to see that it was followed to the letter. Five pounds error, plus or minus, can reduce tire longevity by as much as 10 to 20 percent. Establishment of correct tire pressure means that fleet air gauges — long neglected — must be calibrated frequently with a master inflation gauge. The second phase of any tire program aimed at significant cost reduction must be hinged upon personal inspection by the tire expert.

Twice Monthly Inspections

Twice monthly, Mr. Towner inspects the truck fleets, garaged at two of the company's southern California plants. With a special work chart in

*Bureau Chief, Western Round-Up.



Every tire is gauged to make sure hand-holes are aligned, indicating regular maintenance employes are guaging inside tire

Checking dual tires for tread match. This is an important first-step in cutting down tire costs

hand, he goes from tire to tire, gauging for proper inflation. Treads are examined to determine the best time for retreading. He looks for split treads, for carcass bruises which may mean costly blowouts. He inspects for mismatched handholes, the wheel ports which give access to the inside tire's air valve. Mismatched handholes, obscuring the valve, reveals to Mr. Towner that the shop's regular tiremen haven't been gauging — since they can't reach the valve. Another chore is to check with a "mating square" for proper mating of dual-drive tires. The square is a 90-deg. angle, held flush with the outside tire carcass. It measures the difference between tread heights. For a 9.00 size tire, not more than ¼-in. "mismatch" is permissible. Truck tires in the 10.00 and 11.00 bracket may be mismatched as much as half an inch, but never more. The solution: pull the tires, replace with matched sets.

Why, for instance, is a mere ¼- to ½-in. mismatch so important, economy-wise? If the inside tread is higher than the outside, the outside tire simply "goes along for the ride," puts all the load on the other — increasing wear.

If, after several months, Mr. Towner discovers some persistent fault, he hauls out his 4 x 5 Speed Graphic and snaps a photograph. This photograph, plus a resume of every three months' findings, go into a quarterly report handed management — a critique updating the condition of the fleet's rubber.

Meantime, during twice-monthly inspections, the independent tire engineer notes tire faults on a special worksheet. The sheet is meaningful be-

Rim in bad condition ruined this tire

Tire damaged when it was beaten off rim during a tire change

cause it pin-points troubles, ties them to specific tires on specific trucks or trailer units. Thus, for best results, all trucks must be numbered. And, so that blame may be squarely placed, management should permanently assign drivers to their trucks. In that way, the tire man's findings also point up which drivers do a good job, which cost the company hundreds of dollars in unnecessary tire replacement.

Typically, the expert's worksheet is coded across the page, for example: RF means right front tire; RRI (right rear inside). He merely notes a truck's number, fills in a specific tire space with a code: "5" means a slow leak; "6" indicates a valve core leak, etc. As Mr. Towner moves from tire to tire, and from truck unit to another, he may pencil a "6" opposite truck No. 345, in space RF. This indicates to Arrow Rock Co.'s regular tiremen that truck No. 345 has a valve core leak in its right front tire.

At inspection's end, the tire expert hands the worksheet to the tire department, and dispatches a duplicate to management. It's management's job to follow through, to see that the work is done. Neither Mr. Towner — nor any other tire engineer, for that matter — gives orders. He is merely a tire scientist. He has no managerial capacity whatsoever.

How scientific is tire engineering as applied to the average fleet?

Not long ago Mr. Towner (who has a dozen client-fleets) was stopped by a driver.

"How am I doin'?" the driver asked, fully expecting to be complimented.

Mr. Towner didn't answer immediately. Instead, he riffled his worksheets and summary reports. Then he retorted, "fellow, you're doing lousy."

"Yeah," said the driver, "and who says so?"

Mr. Towner shrugged. "Your tires say so. The whole story's written right there in their treads."

The evidence was convicting. The driver's truck (to which he was permanently assigned) was No. 067 in a construction fleet. Its treads were chipped and cut, the rubber chewed when the driver had spun his wheels rather than drop a gear. Flat places on the tread told of too fast braking. Excessive heel and toe wear indicated shuddering stops at intersections.

The driver admitted his guilt and went away mumbling something about that "damned rubber detective."

Admittedly, an independent tire expert trying to squeeze the last drop of life from a carcass, isn't always the most popular guy around a fleet's garage. But, as an independent, his unbiased services are invaluable to management.

For example, when a sand and gravel, crushed stone, or ready-mixed concrete producer wants to experiment with various brands of tires, the expert sets up a "test fleet" — a half dozen trucks tired with the brand under study. Six months and a dozen inspections pretty well tell the expert if the brand will do the job.

Scientific deduction is also applied during a fleet's tailor-made inflation program. By studying blown carcasses, Mr. Towner adjusts and revises inflation schedules. If tires blow in any of three patterns — "X", "Y", or "T", too high air pressure is indicated. A diagonal break is usually indicative of overheating. This may mean excessive speeds or hot-weather fatigue.

Maximum Use of Recaps

When upwards to $100,000 worth of rubber is involved, a fleet's tires will do better in scientific hands, according to Arrow Rock Co.'s findings over the past five years.

A good tire engineer can often get three recaps from carcasses which once were lucky to last through a single recapping. Since recaps cost less than $20, while a new carcass is price-tagged in the $100 range, this saving multiplied over the fleet can mean significant cost reductions. It also means more miles per tire — often double the tire life. In the case of one producer, an expert's care reduced cost per mile from three cents to less than three mills.

What's the cost of hiring an expert? That varies, depending upon fleet size, but the monthly fee ranges from $100 to $250.

The detailed, photo-illustrated quarterly reports are, in themselves, probably worth the fee. Reports detail every blowout, recap, and mismatch experienced by the fleet. It is statistical, showing the cause of tire failures.

A recent Arrow Rock Co. appraisal showed:

Times capped	No. of Tires	Percent of Total
1	62	78.5
2	10	12.7
3	6	7.6
New tires		—
Scrapped — 1		1.2
		100%

When the tire expert removes a tire, management knows the reasons why: (1) worn out—scrapped; (2) smooth —for recap; (3) diagonal breaks; (4) "X" breaks; (5) previous injury blow; (6) ply; (7) repair failure; (8) cuts—carcass; (9) run flat, etc.

If the tire inflation program is rigidly and scientifically followed, details as to the number of tires correctly or incorrectly inflated will be known. Thus, on one recent report, it was noted that, "Our efforts to maintain an inflation schedule has resulted in a fairly steady inflation; 1.6 percent of all fleet tires were found to be underinflated; 8.2 percent were over-inflated or were checked hot; 90.2 percent were correctly inflated."

Nation-wide, more and more companies are hiring experts — and reducing tire costs.

A.I.M.E. Annual Meeting

THE AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, Industrial Minerals Division, will hold its annual meeting October 5-9, 1954, at Whiteface Inn, Lake Placid, N. Y. Registration will take place all day October 5. The morning session, October 6, will include the following papers: "Geology of the Adirondacks," Matt S. Walton, Jr., Yale University; "Mineral Economics of Upstate New York," John A. Graham, New York State Science Service; and "Geological Control of Adirondack Mineral Deposits," A. E. J. Engle, California Institute of Technology. The afternoon session will include the following papers: "Anorthosite as an Industrial Mineral," J. G. Broughton, New York State Science Service; "Operations of International Talc Co.," F. G. Kuehl and Roger Miller, International Talc Co.; and "Magnetic Anomalies and Geophysical Prospecting in the Adirondacks," LeRoy Scharon, Washington University.

The October 7, morning session will include: "Wollastonite and Diopside, New Industrial Minerals," Raymond Ladoo, Consultant; "Commercial Colored Slates of New York and Vermont," D. M. Larabee, U. S. Geological Survey; "Geochemistry and Importance of Saratoga Mineral Waters," Lester W. Strock, Sylvania; and "Quality Control in the Manufacture of Extender Pigments," by Charles H. Pratt, Cabot Minerals. In the afternoon, members will tour the quarry and plant of Cabot Minerals' new wollastonite operations at Willsboro, N. Y.

Two papers will be presented at the October 8 morning session: "Industrial Minerals of the Ottawa Valley," by N. B. Davis, Canadian Flint and Spar Co., and "Gypsum Deposits at Dutch Settlement, N. S.," by Oliver Campbell, National Gypsum (Canada) Ltd. The afternoon will be devoted to social and sporting events, and a farewell banquet and informal dance will be held in the evening.

October 9 will be available for field trips by personal cars.

A social hour will be held each evening of the convention just before dinner, and on October 7, films will be shown on Northern New York and other selected subjects. Bus trips will be provided for the ladies.

Theory and Practice of

LIME MANUFACTURE

By VICTOR J. AZBE*

Part XII. Rotary kiln draft—its effect on kiln capacity.

ROTARY KILN LIME PLANTS having colossal stacks are often found, and the immediate and natural conclusion would be that, comparable to boiler plants, they are intended to create a high kiln draft for increased kiln capacity. However, actually this is more often not the case and the rotary is receiving no direct benefit from the draft of the large stack.

The draft from the stack and often even from the induced draft fan is used up in pressure loss due to velocity and friction in taking the kiln gases and rear leakage air away from the kiln; the kiln itself being operated on the draft created by its own stack effect. This is the hydrostatic pressure differential created by the difference in height between the air inlet and exhaust gas outlet, and the difference in density between the external air and the high temperature rarified kiln gases.

Strangely, this all too frequently is not realized, with the result that maximum possible capacity is not obtained. Virtually all rotary kiln installations we have encountered were in some manner limited in capacity by the draft. The longer the kiln, the greater its inclination and the higher its temperature, the greater will be the draft produced. What this may be can be determined with the aid of Fig. 1 presenting the density of kiln gases.

Assuming the median annual temperature of 60 deg. F., and an average temperature through the kiln of 1800 deg. F., the difference in density would be .0765 − .02 = .0565. Assuming the kiln to be 175 ft. long and having .5 in. inclination per foot, the difference in elevation of the ends would be 7.3 ft. The theoretical draft would be:—

$$H_t = 0.192 \triangle DL = 0.192\ (D_a - D_t)\ L = 0.192 \times 0.0565 \times 7.3 = 0.08 \text{ in. w.g.}$$

H_t = Theoretical draft
D_a = Density of air at 60 deg. and 30 in. Hg.
D_t = Density of gases at temperature = 1800 deg. F.
L = Height
.192 = Conversion factor to in. w.g.

Correcting Draft Deficiency

This at least is the manner in which theoretical draft is ordinarily calculated, but to our mind it does not seem to be entirely right. Draft is a matter of mean density which can only be correctly obtained in adding up the average of the densities corresponding to temperature of several kiln sections but what these are is seldom known.

The rotary requires draft to create gas velocity and to overcome friction. Not very much is required under ordinary capacity rates, and the kiln draft producing capacity is sufficient if the kiln is not in any manner choked. However, very often this happens to be the case. This choking may be in the admittance of air to the hood, or may be at the rear constriction where the feed pipe enters the kiln proper.

When the kiln capacity is low or when an increase is desired, almost the very first and certainly the most important act is to see if the feed pipe smokes. If it does, draft is being limited and capacity also is in consequence limited.

The most important draft measurement is the draft in the kiln near the gas outlet, which, however, is never determined. Ordinarily draft is measured in the dust chamber but that is not the draft at the outlet of the kiln

(Continued on page 86)

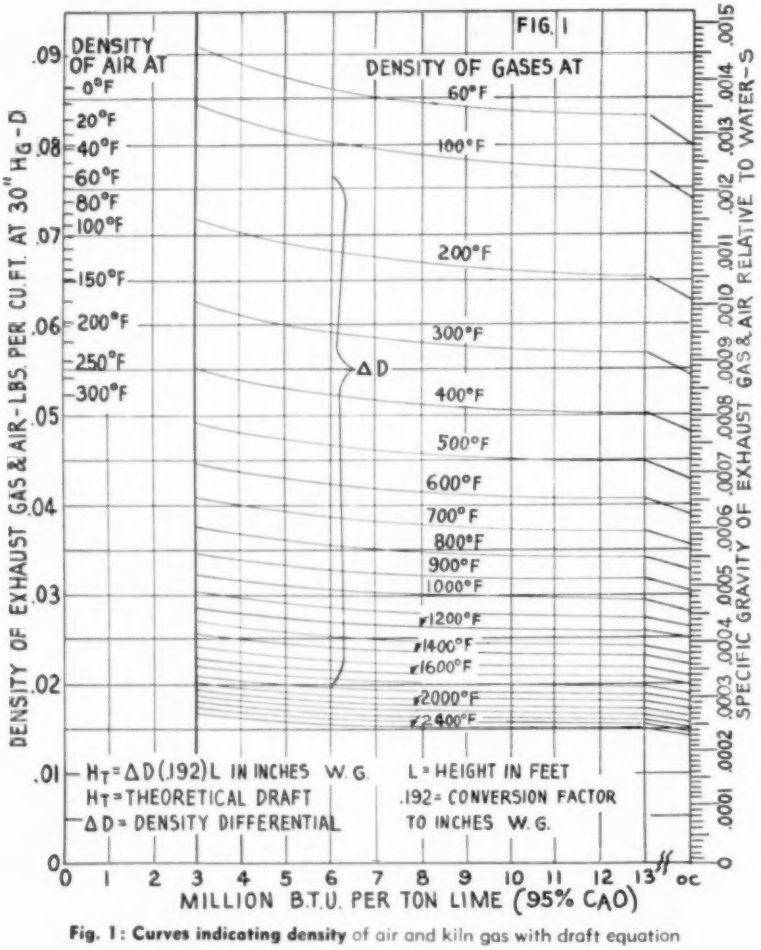


Fig. 1: Curves indicating density of air and kiln gas with draft equation

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KVS machinery is designed and engineered for low cost production . . . peak capacity . . . long life . . . low maintenance cost. This world-famous equipment includes *more* exclusive built-in features than any other made . . . patented operational features . . . job-proved by plant operation records . . . that assure satisfactory service and freedom from time-consuming down time under the most severe operating conditions.

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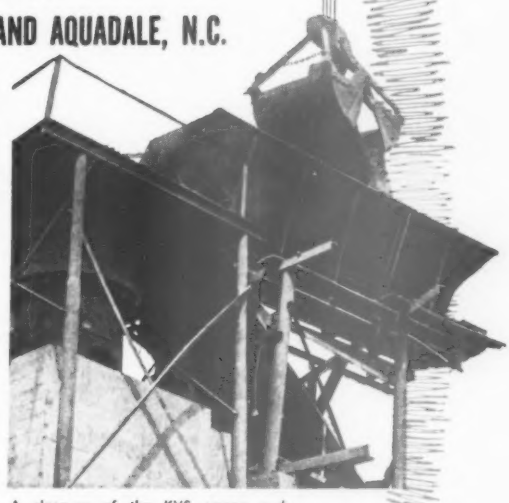
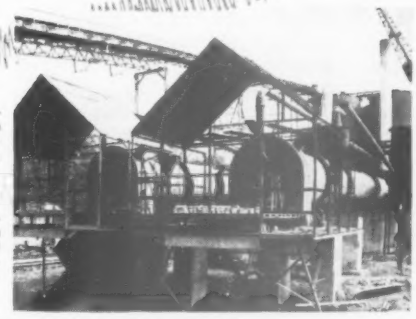


A close-up of the KVS screen and secondary crusher, employed in plant of Southern Lightweight Aggregate Corporation at Bremo Bluff, Va.

KVS Ball Mill and Vibrating Screen in operation at Carolina Solite Corporation Plant, Aquadale, N. C.

New plant under construction for Carolina Solite Corporation at Aquadale, N. C., showing rotary Kilns from firing end.



A view of the overall Solite operation at Bremo Bluff, Virginia —the largest plant of its kind in the world producing a controlled lightweight aggregate.

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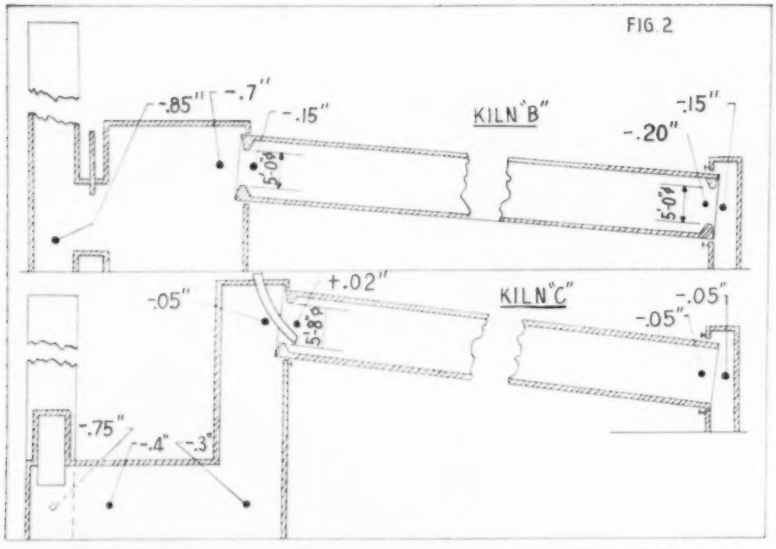


Fig. 2: Draft drop through rotary lime kiln system, kiln "B" and "C"

under which the kiln actually operates. Even if the feed pipe does not smoke, which would be a sure indication that the gases cannot move freely, the draft within the kiln may still be so low as to be almost imperceptible. Under such conditions more fuel can be fed, but the general effect would be to cool the kiln and lower rather than raise production because of insufficient air.

The rear stone spillage dam and the feed pipe coming in on a slant acting as a choke are by no means constant in resistance, increasing as the dust builds up on the feed pipe and feed pipe hangers.

This feed choke draft drop may have a very great influence on kiln performance because the resistance to gas flow varies as the square of velocity and directly as the absolute temperature. This increases any draft drop required far out of all proportion to the capacity increase.

The rear constriction is virtually an orifice whose pressure drop, even though slight in variation, may reveal much to one having the requisite basic knowledge and the ability for micrometric perception and evaluation of flow relationship to area, volume, and temperature relationships and in turn to capacity of the kiln. In vertical kiln practice one deals with draft in inches and tenths of w.g., but in the case of rotary kilns it is in tenths and hundreds and it is as important as the higher draft in the vertical kilns.

Below is presented the case of two 9- x 175-ft. kilns, both connected to high stacks and operating on natural draft, both run at their utmost possible capacity, but one producing 240 tons and the other only 180 tons of lime per day. The effect of the difference of 60 tons can be quite consequential and can readily throw the plant from the profit-making to the losing side.

The question is, why precisely does one of these very similar kilns produce so much more than the other. There could be many reasons, of course, but in this case it was quite definitely a matter of draft and it is often alone as important as all the other reasons.

The higher capacity unit will be designated the "B" kiln and the lower capacity, the "C" kiln. The system of rear-end connections and of prevailing draft is illustrated by "B" and "C" of Fig. 2.

It will be noted that in the case of "B" kiln, the draft at the base of the stack was more than at the kiln. This was in part due to the difference in height and in part due to a degree of friction. However, considering the relative height, very little of the latter was evident and the draft drop between the stack and the end of the kiln was at a minimum.

The rear choke opening was 5 ft. in diameter through which the feed pipe entered. The draft outside of the choke was —.7 in., and inside the kiln it was —.15 in., or a drop of .55 in. across the constriction and past the pipe obstruction.

At the hot end, the kiln had a heavy dam, creating a choke from a 5-ft. opening, horizontally, through which the fuel pipe extended. On the kiln side of the choke, the draft was —.2 in. and on the hood side —.15 in. The kiln thus was able to produce 240 tons on its own created draft plus overcoming resistance of the hot end dam. The draft in the kiln at the feed end and in the hood were equal at —.15 in.

That the 240-ton capacity was possible was due to the —.7 in. draft in the dust chamber. Of this —.55 in. was used to draw the gases through the rather heavy rear construction and —.15 in. was used to bring the air into the hood and give it the necessary momentum. Draft at the kiln outlet and at the hood are the same. Thus draft produced by the kiln was used up in friction across the discharge dam and through the kiln.

The damper was wide open. All of the draft obtained was utilized and any draft reduction for any reasons would have reduced the capacity. This was so in the case of kiln "C". While the draft at the base of the stack was close to the same in both kilns, due to constricted and tortuous dust chamber connections, draft in the dust chamber at the center of the kiln outlet was only —.05 in. Inside the kiln there was pressure, so slight that it could hardly be measured, but the

(Continued on page 89)

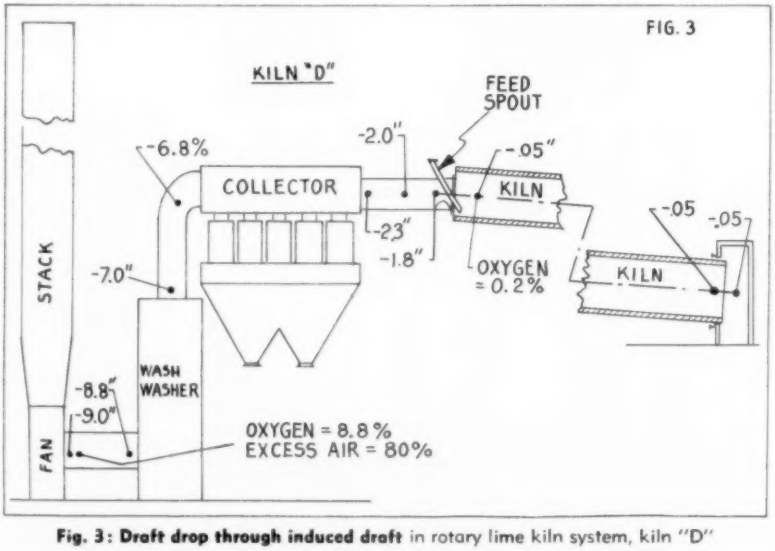
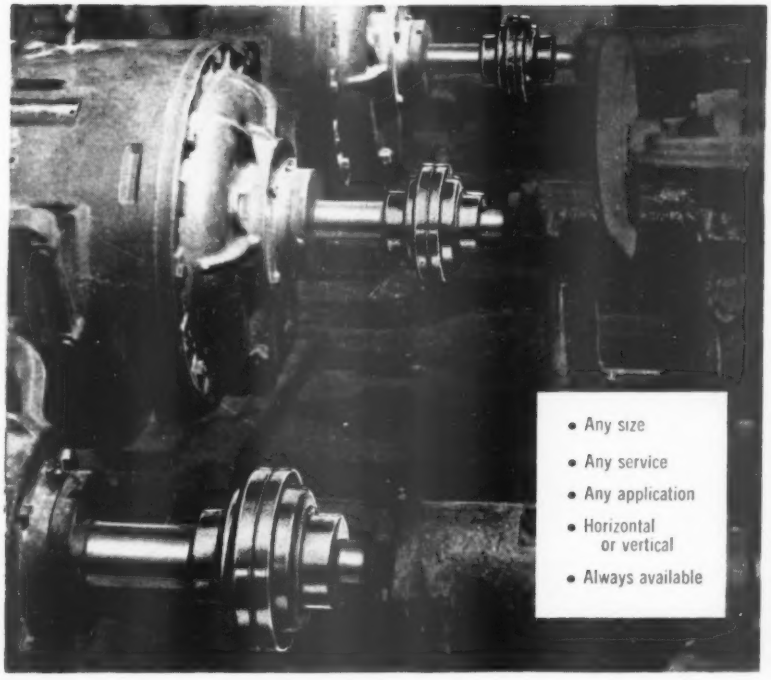
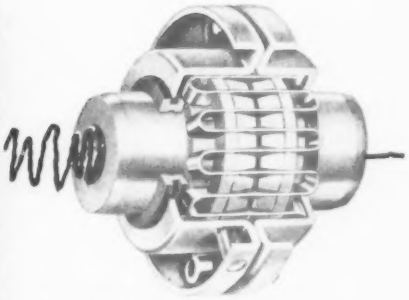


Fig. 3: Draft drop through induced draft in rotary lime kiln system, kiln "D"





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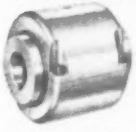
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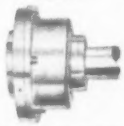
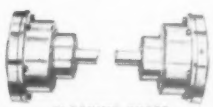

EXTENDED SHAFT
Type P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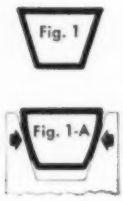
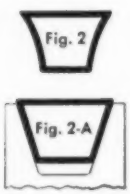


To prove how the CONCAVE SIDES of GATES VULCO ROPES *save money*, just make this simple test—

Bend *any* V-Belt that has *straight sides* (Fig. 1) and—as the belt bends—*feel* the sides *bulge out* (Fig. 1-A). This out-bulge concentrates the wear at the points shown by arrows—and this naturally shortens the life of a *straight-sided* belt!

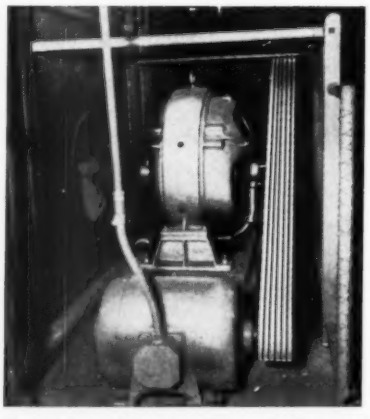
Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

(U. S. PAT. 1813698)



You find that the CONCAVE SIDES *fill out* and become perfectly straight. They thus press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the GATES VULCO ROPE—and this means *longer* belt *life* and *lower* belt *cost* for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the GATES VULCO ROPE!



Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

VULCO ROPE DRIVES

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CS-548

feed pipe was spouting gas. There still was draft at the hood but it all was induced by the kiln.

Installation of such a heavy dam as the "B" kiln had, would in the case of "C" kiln, have further throttled the flow and would have hindered production rather than helped it.

"C" kiln was also more open at the rear. How the two compare in these respects is presented below.

	"B" Kiln	"C" Kiln
Diameter feed end opening	5 ft.	5 ft. 8 in.
Area of opening minus area slanted 13 in. feed pipe	14.2	19.0 sq. ft.
Lime production per day	240	180 tons
Lime per square foot opening	16.9	9.5 tons
Draft-drop across rear opening	.55	.07 in.

While "B" kiln could have been opened more, in the case of "C", it was fully open and nothing could have helped but to increase the draft, by reducing friction through more direct connections, by keeping the dust chamber cleaner and reducing air inleakage. Leakage air not only lowers the stack temperature but increases friction very greatly due to the high density of cold air compared to that of the hot rarified kiln gases.

Of course, what also would have helped would have been to thermally improve the kiln. At a higher fuel ratio, the gas weight and gas temperature both would have been less, and friction much less because it varies with the square of mass velocity.

A pressurized cooler helps to bring air at velocity to the kiln, and an ex-

Instructions and Comments on use of chart

● **When flow resistance calculations** need to be pre-determined, it is first necessary to obtain the "Reynolds Number" which, in effect is the "Flow Characteristic" of the particular fluid at the particular velocity. With its aid the "Resistance Characteristics" or "Friction Factor" of the channel through which the gas flows are obtained, such as a rotary kiln, its connecting ducts or chimney. However, .0021 applies fairly close over a wide range of Reynolds numbers encountered in kiln work.

The next in the series of calculations is the incorporation of the friction factor into Fanning's equation through which the "Pressure Drop" or "Draft Loss" are determined.

$$\triangle H = \frac{2f \times D_t \times L \times U^2}{gd}$$

$\triangle H$ = Draft loss in inches of water column
f = Friction factor = Resistance characteristics of the channel
D_t = Density of gas at temperature, lb./cu. ft.
L = Length or Height in feet
U^2 = Velocity of gas at temperature, feet per second
g = Gravitational constant = 32.174
d = Equivalent diameter of free area of duct in feet

If the pressure drop and all the other above conditions are known, then the friction factor can be experimentally determined. This is necessary in case of heavily obstructed flow in vertical kilns. For open ducts the .0021 comes rather close.

In the study of the above equation we note that draft drop varies as follows:— (1) Directly as the density of the gas which varies inversely with its absolute temperature; (2) As the square of gas velocity; (3) Inversely with the free area of the gas passage

For the purpose of obtaining draft drop change through the change of any of the above set of conditions, the following equation would apply:—

$$H_2 = H_1 \frac{(U_2)^2}{T_2 d_2} \times \frac{T_1 d_1}{(U_1)^2}$$

H_1, U_1, T_1, d_1, = Pressure, velocity, temperature and area before change

H_2, U_2, T_2, d_2, = Pressure, velocity, temperature and area after change

This chart was devised to simplify the approach to this draft problem. It is based essentially on the above stated relationship but takes into consideration certain kiln operating factors. The volume of kiln gas variation with the kiln heat demand in million B.t.u. per ton of lime produced is the first factor. Variation of volume due to the excess air is second, and variation due to change of kiln lime production is the third. The fourth is variation due to temperature in which case only the T_2 ratio needs to be calculated.

T_1

The chart presents two examples, the first is somewhat extreme where the kiln operated at 4.4 million B.t.u. with no excess air, a unity capacity and whatever temperatures such an operating condition would give. The line as noted starts at 40 cu. ft., follows unity conditions and terminates at unity draft drop.

The second example assumes 8 million B.t.u. and 20 percent excess air, it further assumes 40 percent higher capacity and an increase of gas temperature which would give a T_2 ratio of 1.5. The resulting

T_1

draft drop would be 10.5 times that of the first case.

These are mere examples. Any set of conditions can be chosen as a base and any other set worked against it. The effect of kiln efficiency, excess air, capacity, and of terminal temperature may be valuated for the entire system or for only any portion of the system.

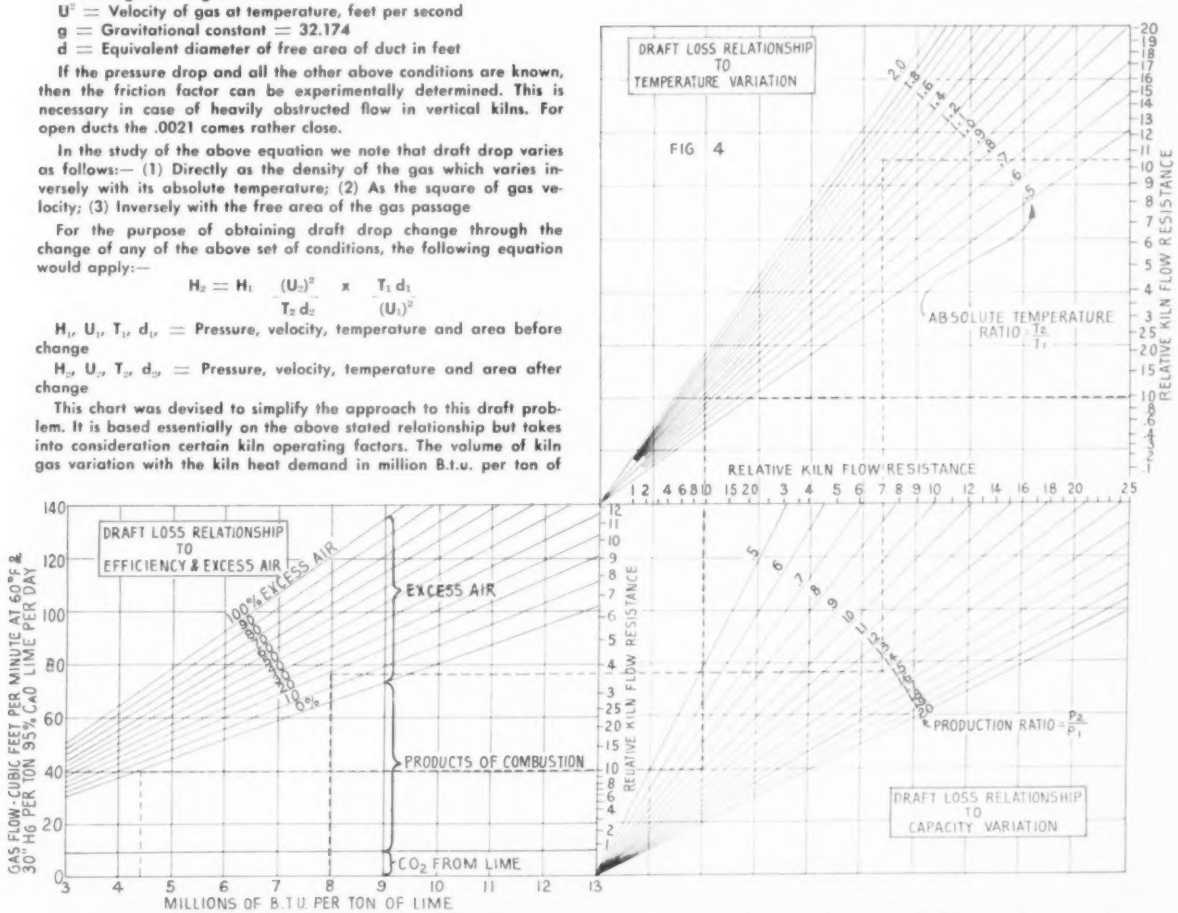
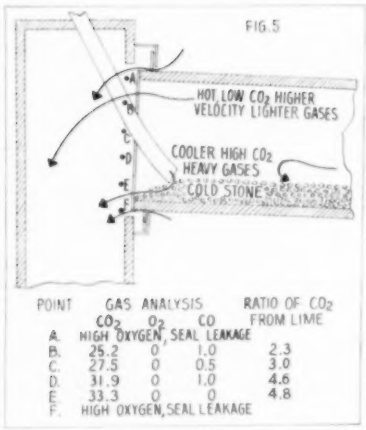

DRAFT LOSS RELATIONSHIP TO TEMPERATURE VARIATION
FIG 4
ABSOLUTE TEMPERATURE RATIO = T2/T1
RELATIVE KILN FLOW RESISTANCE
RELATIVE KILN FLOW RESISTANCE
DRAFT LOSS RELATIONSHIP TO EFFICIENCY & EXCESS AIR
100% EXCESS AIR
0%
EXCESS AIR
PRODUCTS OF COMBUSTION
CO2 FROM LIME
GAS FLOW - CUBIC FEET PER MINUTE AT 60°F & 30" Hg PER TON 95% CaO LIME PER DAY
MILLIONS OF B.T.U. PER TON OF LIME
PRODUCTION RATIO = P2/P1
DRAFT LOSS RELATIONSHIP TO CAPACITY VARIATION

Fig. 4: Lime kiln draft loss curves with relation to temperature variation, capacity variation, and efficiency and excess air



POINT	GAS ANALYSIS CO_2	O_2	CO	RATIO OF CO_2 FROM LIME
A.	HIGH OXYGEN, SEAL LEAKAGE			
B.	25.2	0	1.0	2.3
C.	27.5	0	0.5	3.0
D.	31.9	0	1.0	4.6
E.	33.3	0	0	4.8
F.	HIGH OXYGEN, SEAL LEAKAGE			

Fig. 5: Cross section showing rotary kiln gas stream segregation

haust fan also helps but that brings on its own problems which are not always clearly foreseen and provided for with the result that frequently there is no increase in capacity.

Fans complicate necessary connections and, as most rotary kilns put out gases too hot for the fans, cooling these gases needs to be provided for. If this is by means of cool air inducement, friction in the connections is increased to such an extent that a draft deficiency remains.

Fans are always used when dust collectors and gas washers are involved. Such systems are always of high-flow resistance which, if normal, is ordinarily provided for in ample fan size, fan speed and motor power. But abnormalities, such as deposits and encrustations which increase the friction higher than anticipated gas temperatures that increase the volume, and leakage that increases the mass flow, are usually not foreseen.

We know of many such cases. It seems that in almost all cases the kiln performance possibilities are limited either because the required draft is not available, or kiln forcing must be avoided to hold down exhaust temperature. Fig. 3 presents one such case. Although at the fan there was 9 in. draft, at the kiln discharge within the kiln there was none.

Determining Draft Loss

In the main, faulty design limited exit area because of an arrangement which became obstructed too readily with dust and other accumulations in the connection to the rear kiln seal. It is a strange condition indeed but one generally found, that the rotary lime kiln which in itself requires less draft than almost any combustion apparatus is almost always deficient in draft. Often this happens with little suspicion of the fact on the part of the operators. However, if the fundamental relationship governing pressure drop, in relation to diameter of opening, velocity of flow and temperature of gases are kept in mind, it will be noticed. It is to aid in this that we present some simplified approaches. To obtain the absolute draft loss for any given condition, as shown below by Fanning's equation, is not simple, but to determine the change in draft loss when a set of conditions change is not at all difficult.

$$H = \frac{2f \times D_t \times L \times U^2}{g\ d}$$

H = Draft loss in inches of water column

f = Friction factor = resistance characteristic of the channel

D_t = Density of gas at temperature, lb./cu. ft. from Fig. 1.

L = Length or height in feet

U^2 = Velocity of gas at temperature, feet per second

g = Gravitational constant = 32.174

d = Equivalent diameter of free area of duct in feet

In the study of the above equation, it may be noted that draft drop varies as follows:—

1. Directly as the density of the gas which varies inversely with its absolute temperature

2. As the square of gas velocity

3. Inversely with the free area of the gas passage

To further simplify the approach to this draft drop problem, the chart presented by Fig. 4 was devised. It is based essentially on the above stated relationship but takes certain kiln operating factors into consideration.

The volume of kiln gas variation with the kiln heat demand in millions of B.t.u. per ton of lime produced is the first factor. Variation of volume due to the excess air is the second, and variation due to change of kiln lime production rate is the third. The fourth is variation due to temperature in which case only the $\frac{T_2}{T_1}$ ratio needs to be calculated.

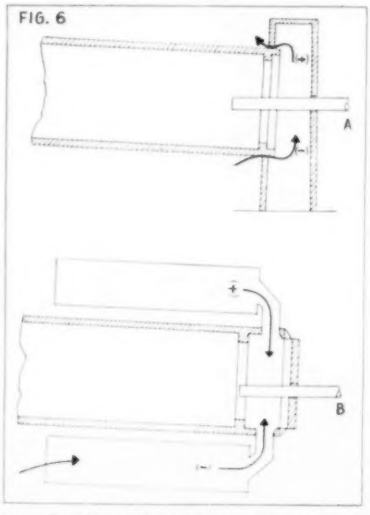


Fig. 6: Effect of height on pressure and flow of gases

The chart presents two examples, the first is somewhat extreme where the kiln operates at 4.4 million B.t.u. with no excess air, a unity capacity and whatever temperature such an operating condition would give. The graph line starts at 40 cu. ft., follows unity conditions and terminates at unity draft drop.

The second example assumes 8 million B.t.u. per ton and 20 percent excess air, it further assumes 40 percent higher capacity and an increase of gas temperature which would give a $\frac{T_2}{T_1}$ ratio of 1.5. The resulting draft drop would be 10.5 times that of the first case.

These are mere examples. Any set of conditions can be chosen as a base and any other set worked against it. The effect of kiln efficiency, of excess air, of capacity and of terminal temperature may be evaluated, for the entire system or only for any portion of the system. In the case of kiln "C", with this chart, effect of excess air, or of kiln capacity, or of change in the entire draft system, or just that of the dust collector may be determined.

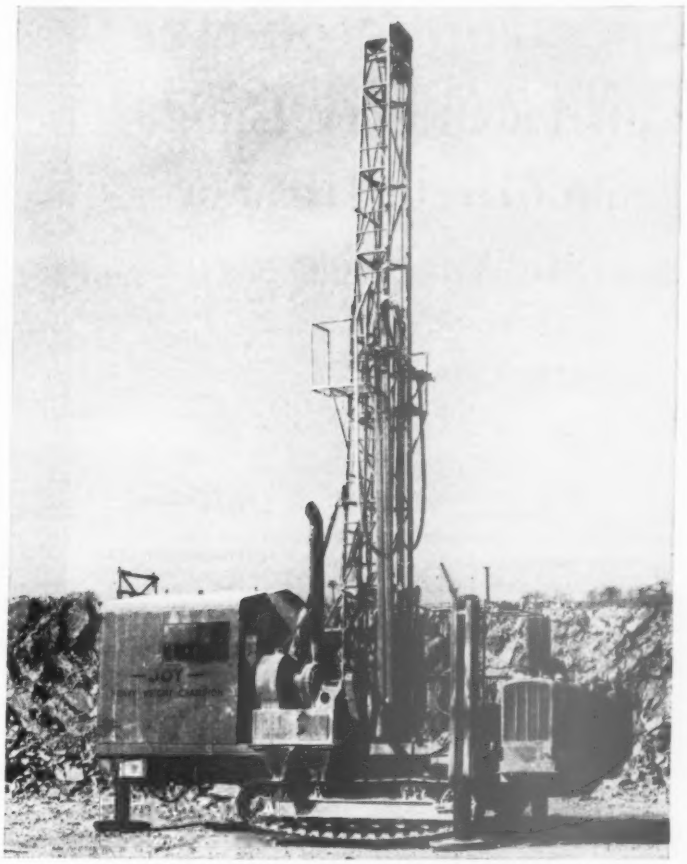
The difference in weight of gases due to their difference in temperature is not merely of interest by virtue of the general flow inducement through the kiln. There are other effects, not all beneficial. Some in fact are quite detrimental to the performance of any kiln. It is not only the vertical kilns that suffer from channeling. We believe the rotary kiln also is impaired in its performance, in likely many unsuspected ways of which we will give only two separate examples.

Assuming a 9- x 175-ft. rotary kiln, operating at 240 tons of lime per day at 6 million B.t.u. per ton. This would be a relatively efficient rotary kiln and the average temperature through the kiln may not be much over 1800 deg. F. At this temperature velocity of the gases would be 22.4 ft. per sec. In less than 8 sec. the gases would pass through the entire kiln. At this rate there would be little chance for natural diffusion and, except at the inlet, little chance for mixing. In fact, mixing would be counteracted and there would be a tendency for thermal segregation.

The gaseous layer flowing along the lime will be richer in CO_2 which will make it heavier, and it will be cooler which also will make it denser. The tendency of this portion of the stream will be to remain in the lower part of the kiln, and for the hotter more rarified, lower CO_2 containing gas to flow in the upper section of the kiln.

(Continued on page 117)

"...this JOY CHAMPION BLAST HOLE DRILL was so good We Bought TWO More"



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CONTRACT BLAST HOLE DRILLER
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"That's not all," states Contract Driller Charles Lauman. "Most of our drilling is in hard, tough dolomite with strata tilted at all angles and loaded with clay pockets and clay seams. We have found that the 58-BH Joy Champion will drill a smoother vertical hole wherever the hole is spotted. This eliminates toes and gives our customers a straight vertical face. We're convinced it's the best machine for the job—so much so that we bought two more on the strength of this one's production."

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Spectrophotometer

Cuts Laboratory Time From 6Hr. to 1Hr. For Silicate Analyses

By PETER L. SHUGART

Spectrophotometer reduces laboratory time for silicate mineral analysis

THE END-USE OF MANY NON-METALLIC MINERALS is influenced by their iron, aluminum, titanium and silica content. For example, powdered talcs and clays used in ceramics must contain minimum iron to avoid specks and poor color in the finished ceramic piece. Talcs used in insulators for high frequency radio, radar and television require close control of aluminum content, which affects their dielectric properties. Titanium content is extremely important in paint pigments and other products requiring a high degree of whiteness. The proportion of silica present in a glass melt directly affects its viscosity and therefore must be closely regulated by glassmakers.

Customary procedures for determining these elements are time-consuming and of questionable accuracy unless performed by highly trained personnel. The sample is usually fused with sodium carbonate, dissolved in hydrochloric acid and the silica separated by dehydration. Iron and aluminum are coprecipitated as the hydroxides, ignited and weighed as the combined oxides. Iron is then determined, and aluminum obtained by difference. This method invites error from several sources. Unless silica is completely removed, for instance, it will contaminate the iron and aluminum precipitate. Also, aluminum results are generally high, since, when obtained by difference, they reflect errors made in the iron determination.[1]

The spectrophotometric procedure, developed by Davenport[2] and modified by Sierra Talc and Clay Co., corrects many of the difficulties and inaccuracies of silicate mineral analysis. Using a Beckman Model DU Spectrophotometer, analysts reduced time for these determinations from 6 hr. to one hr., with results exceeding previous methods in reliability.

Preparation of Sample

A 100 mg. sample of silicate material (minus 100 mesh or finer) is fused with 2 g. sodium carbonate and 0.5 g. of sodium tetraborate in a platinum crucible. This fusion requires more than 5 min. The melt is dissolved and then digested in boiling water. A few drops of phenolphthalein are added and the solution is neutralized with dilute sulfuric acid. (1:10). A 100 percent excess of acid is introduced, plus an additional 0.5 ml. This acidified solution is transferred to a 250 ml. volumetric flask and filled to the mark with distilled water.

Titanium Determination

Titanium in sulfuric acid solution forms a complex of indefinite composition with hydrogen peroxide and shows a narrow maximum absorption band at 400 mμ. (millimicrons) in the presence of orthophosphoric acid. The sensitivity of the method is stated to be 0.07 microgram TiO_2/ml.

Iron interference is eliminated by the addition of a fixed amount of phosphoric acid. Phosphoric acid bleaches the yellow color of the titanium complex, but this can be corrected by the addition of equal amounts of phosphoric acid to both the sample and the standard titanium solutions used in preparing the calibration curve.

Vanadium and molybdenum form peroxide complexes which show absorption maxima at 460 and 330 mμ., respectively. These cations can interfere with the determination of titanium by this method, but are not apt to be present in more than trace quantities in the types of minerals for which this scheme of analysis was devised.

To determine titanium, transfer a suitably sized aliquot of the acidified fusion extract to a 100 ml. volumetric flask, add 5 ml. of 85 percent orthophosphoric acid followed by 5 ml. of 3 percent hydrogen peroxide and fill to the mark with distilled water. Prepare a blank in the same manner. Set the Model DU Spectrophotometer to read 100 percent transmittance on the blank at 400 mμ. and read the transmittance of the unknown solution. Then obtain the concentration of the unknown from a previously prepared calibration curve of transmittance vs. titanium concentration.

Iron and Aluminum Determination

Iron and aluminum can be determined in either of two ways: (1) directly on an aliquot of the acidified fusion extract, or (2) individually, after they have been separated from other constituents as the hydroxides and redissolved. By the second course, calcium and magnesium can be determined by flame photometry in the filtrate from the combined hydroxide precipitation, which at this point should contain only calcium, magnesium, sodium and potassium.

To determine iron and aluminum, transfer an appropriate aliquot of either solution (1) or (2) into a 100 ml. volumetric flask, add 2 drops of phenolphthalein and neutralize with 1 N sodium hydroxide. Then add 3 ml. 1:9 hydrochloric acid, 3 ml. 1:9 nitric acid, 20 ml. 10 percent ammonium acetate and 8 ml. 0.2 percent ferron reagent (8-hydroxy-7-iodo-5-quin-

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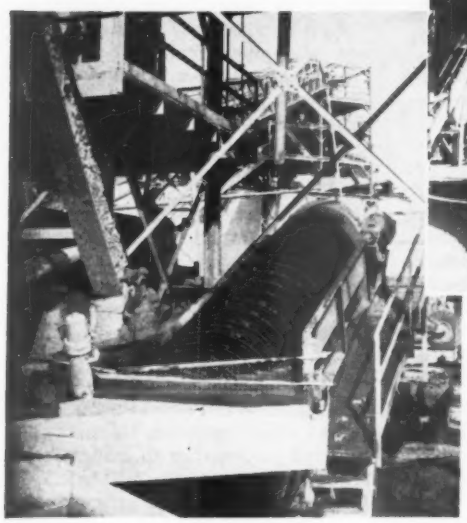

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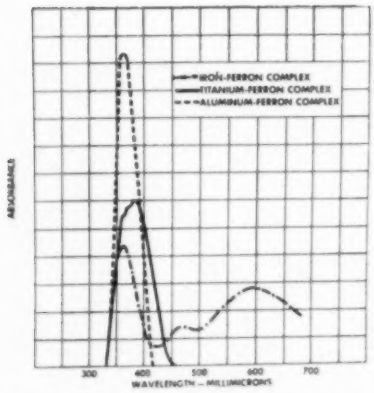

Fig. 1: Typical absorbance curves for ferron complexes of iron, aluminum and titanium

olinesulfonic acid). Fill the flask to the mark with pH 5.0 buffer solution composed of 238.5 ml. 0.1 N sodium hydroxide and 500 ml. 0.1 M potassium acid phthalate diluted to 1000 ml. with distilled water. Sierra Talc and Clay Co. uses a Beckman Model H-2 pH meter to check the solution, since small deviations in pH will materially affect the depth of color produced. A blank is prepared in an identical manner. The color that is formed shows maximum absorption bands at 600 mμ. for iron and 365 for aluminum. Titanium also reacts to form a color with ferron reagent which peaks at 385 mμ.

Since iron and titanium interfere with the aluminum determination at 365 mμ., it is necessary to draw a calibration curve for iron at 600 mμ., another for the same concentrations at 365 mμ., and separate curves for aluminum and titanium at 365 mμ. During analysis of an unknown, iron is first determined by absorbance reading at 600 mμ. This figure is used to correct for aluminum at 365 mμ., since the iron and aluminum curves at this wavelength are additive. The amount of titanium present in the sample is determined by the hydrogen peroxide method at 400 mμ. A titanium-ferron calibration curve at 365 mμ. will then indicate the appropriate correction. Fig. 1 shows typical absorbance curves for ferron complexes of iron, aluminum and titanium.

Calibration curves are prepared by developing the ferron complexes in standard solutions of iron, aluminum or titanium containing from 10 to 100 micrograms per 25 ml. and measuring absorbance changes with changes in concentration. When used with a Model DU Spectrophotometer, the method is sensitive to within 0.1 microgram of iron or aluminum per 25 ml. The complexes are stable for reasonably long periods of time and the method is suitable for the determination of 0-100 micrograms of aluminum in the presence of 0-100 micrograms of iron.

Calcium and magnesium show no interfering effect. Chromate, cupric, manganous, molybdate, nickelous, tetravalent thorium, hexavalent uranium, zinc and tetravalent zirconium ions tend to increase the absorption of the aluminum-ferron complex at 365 mμ., but are not present to any significant extent in the types of silicates involved.

Silica Determination

Transfer 25 ml. aliquot of the acidified fusion extract to a 100 ml. volumetric flask. Add 25 ml. distilled water followed by 10 ml. dilute sulfuric acid (1:10) and 10 ml. ammonium molybdate solution (10g. reagent grade ammonium molybdate dissolved in 90 ml. distilled water and 10 ml. concentrated ammonium hydroxide). Add distilled water to bring the volume up to the 100 ml. mark.

This mixture is set aside for exactly 40 min. for color development of yellow silicomolybdic acid. Transmittance at 410 mμ. is then measured with a Model DU Spectrophotometer and 1.00 cm. cells. A blank should be prepared at the same time and in exactly the same manner as the sample.

This blank is used to set the spectrophotometer to 100 percent transmittance. The spectrophotometer is set for maximum sensitivity during all measurements. Silica content is then determined by means of a standard calibration curve prepared from weighed amounts of Bureau of Standards Sample No. 81 glass sand, which are treated as outlined in the sample preparation and silica determination procedures.

This method is sensitive to 0.2 mg. SiO_2/liter. The method was found to check the gravimetric for silicon to within 0.2 percent for a variety of silicates containing from 99.27 percent SiO_2 to 45.09 percent SiO_2. Not more than one hour is required for the complete test as compared with about 6 hr. by the gravimetric procedure.

With but few exceptions, the reaction is specific for silicon. Iron and phosphate are the two most notable exceptions. It has been stated that phosphates, arsenates and arsenites in moderate amounts give no color. As much as 20 mg. of iron per liter does not interfere. The addition of phosphoric acid to the preformed silicomolybdic acid does not interfere with the color and destroys the interfering color of iron compounds.[3]

Representatives of Sierra Talc and Clay Co. state that the sensitivity and high resolving power of the Beckman Model DU Spectrophotometer are essential, in their opinion, for proper calibration and reproducibility of these methods. Exact wavelength calibration, as obtainable with this instrument, is of considerable importance.

Spectrophotometric procedures for iron, aluminum, titanium, and silica can simplify and speed analytical work on many products, including glass, glass sand, silicate rock, portland cement, refractory cement and brick, and constituents of metal alloys. Accurate results can be obtained with less skill and training than are needed for the more exacting and tedious conventional methods. With minor modifications, these procedures also apply to the determination of iron and silica in water.

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[1]Mellor, J. W., and Thompson, H. V. **A Treatise on Quantitative Inorganic Analysis**, 2nd ed. Chas. Griffin & Co., Ltd., London, p. 198 (1938).
[2]Davenport, W. H., **Determination of Aluminum in Presence of Iron, Spectrophotometric Method Using Ferron**, Anal. Chem. Vol. 21, No. 6, June 13, 1949, pp. 710-711.
[3]Snell & Snell, **Colorimetric Methods of Analysis**, Vol. I, 1st Ed., Van Nostrand & Co., Inc., N. Y. (1936) pp. 517-525.

German Cement Sales

DYCKERHOFF PORTLAND ZEMENTWERKE AG, Wiesbaden, Germany, has reported an increase in cement sales from 1,990,000 tons in 1952 to 2,330,000 tons in 1953. Overall cement sales in Germany for 1953 amounted to 15,500,000 tons, compared to 12,600,000 for 1952. The current construction boom has absorbed most of the production, with residential building alone increasing from 440,000 units in 1952 to 515,000 units in 1953. The 1954 construction figure is expected to equal that of 1953. Despite the increased demand, the German industry has not found it hard to meet, due to its expanded capacity. Exports for 1954, however, are not anticipated to meet the level set in 1953. The chief buyers of German cement, such as Argentina, Brazil and Turkey, are among those with which bilateral trade agreements exist and which have accumulated sizable debits in dealings with Germany. Therefore, import licenses have frequently been refused by the potential buyer countries, and German producers have been unwilling to assume the transfer risk.

Sets New Safety Record

NATIONAL GYPSUM CO., Buffalo, N. Y., recently announced that during the first four months of 1954 its safety record improved 60 percent over its record for the same period in 1953. Reportable injuries in all 35 plants totalled 73, or 17.4 per million man-hours worked, as compared with 191 or 43.8 per million man-hours in 1953. Lost-time accidents declined in this period from 15.1 per million man-hours to 6.4. Savings to the company were estimated at nearly $170,000.

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In photo below camera catches Dempster-Diggster ready to back off and move up to a truck for loading.

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Secondary crushing and screening section of plant has four gyratory type crushers operated by diesel engines and two 5- x 14-ft. double-deck scalping screens operated by 15-hp. electric motors

Big Quarry - Big Crusher - Big Job

• Morrison-Knudsen Co. sets up crushing plant in Venezuela to produce 600,000 tons annually for railroad ballast and highway materials for big steel company project

By JAMES JOSEPH*

DURING THE PAST YEAR some 600,000 tons of high-grade ballast have been produced at a new $750,000 stone crushing plant which helped lay Orinoco Mining Co.'s 91 miles of trackage, set up by Morrison-Knudsen Co. to build the railroad and highway project for U. S. Steel Co.'s Orinoco Mining Company in eastern Venezuela.

The railroad will tap the fabulous iron-capped mountain, Cerro Bolivar, and its half-billion tons of high-grade ore (63 percent pure) and transport the ore 91 miles to U. S. Steel's new Orinoco river port-town, Puerto Ordaz. From there, iron ore will be loaded onto ocean-going vessels and carried to the Fairless plant on the east coast of the United States.

Morrison-Knudsen Co. set up its efficient crushing plant at kilometer 45 along the railroad for near-at-hand was a nearly seamless mass of extremely hard granite, mixed with some quartzite. While the ballast material was ideal from a railroader's standpoint, it was heavy and an extremely hard material for the crushers to handle. However, the plant has produced 250 t.p.h., and as many as eight 50-ton ballast-hopper cars were loaded hourly. The plant was operated on a three-shift work schedule.

"But it was tough on the crushers," says Morrison-Knudsen's quarry superintendent, John Daley, from Ontario, Calif. Vernon Woolstenhulmne, drilling and blasting foreman, agrees.

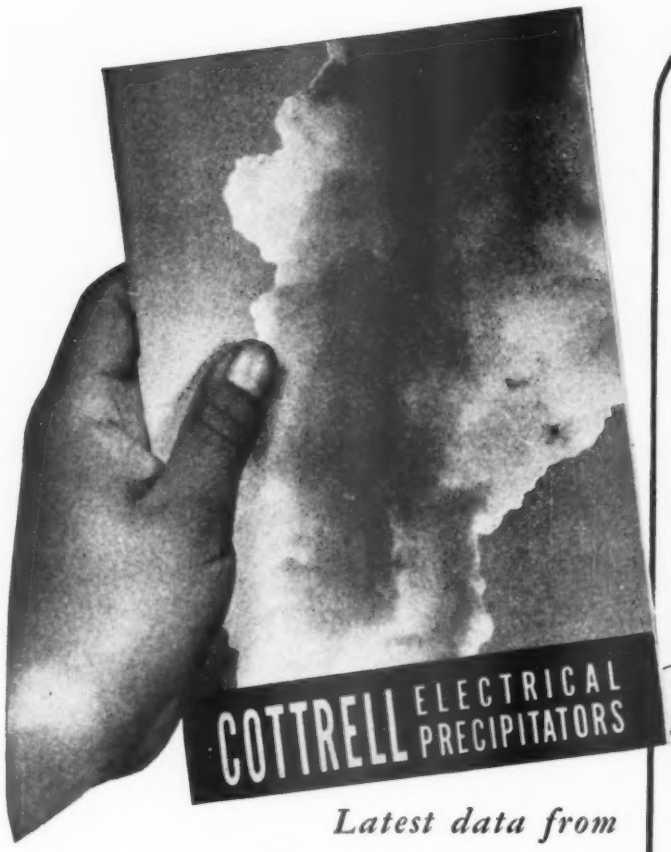
The plant, powered with diesel engines, kept 54 men at the job for nearly 14 months. In all that time, despite humidity as high as 90 percent, torrential rains and occasional flash-floods, the plant piled up an enviable production record.

More that two dozen 9.8-cu. yd. Euclid end-dump trucks shuttled between quarry and crusher (about 1¾-miles), dumping as many as 175 truckloads a shift into the 48- x 60-in. Kennedy primary jaw crusher. Stone products included: (1) 1½- to 2-in. ballast for the railroad; (2) ¾-in. and "fines" — for road surfacing; and (3) rescreened fines used as concrete block aggregate; the concrete block to build homes and offices at Puerto Ordaz.

Crushing and Screening

The primary crusher discharged onto a 36-in. Barber-Greene belt conveyor, 127-ft. 6-in. centers, operating 300 f.p.m., and driven by a 25-hp. motor. This belt conveyor discharged the crushed stone from the primary crusher to a surge pile approximately 40 ft. high with a total raw storage capacity of about 5500 tons and about 1700 tons of live storage. Purpose of the surge pile was to insure uninterrupted operation of the secondary part of the plant during periods when no crushing

*Bureau Chief, Western Round-Up.



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A copy of this data-packed booklet will be sent free to engineers and other executives interested in recovery processes. Send your request to our nearest office.

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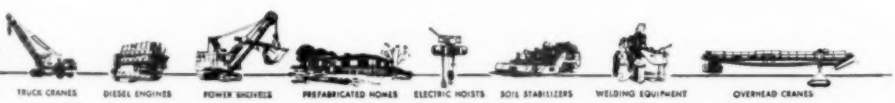

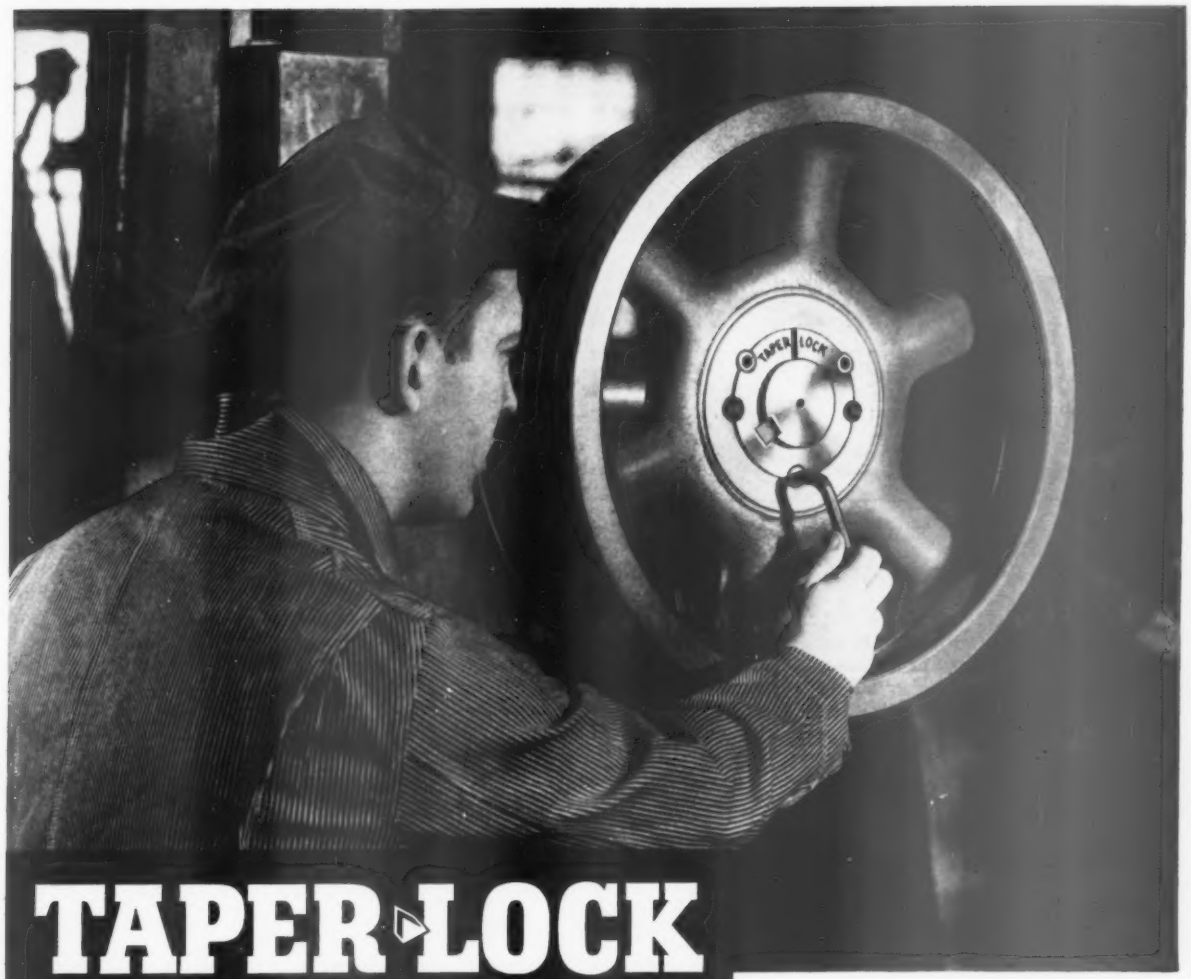

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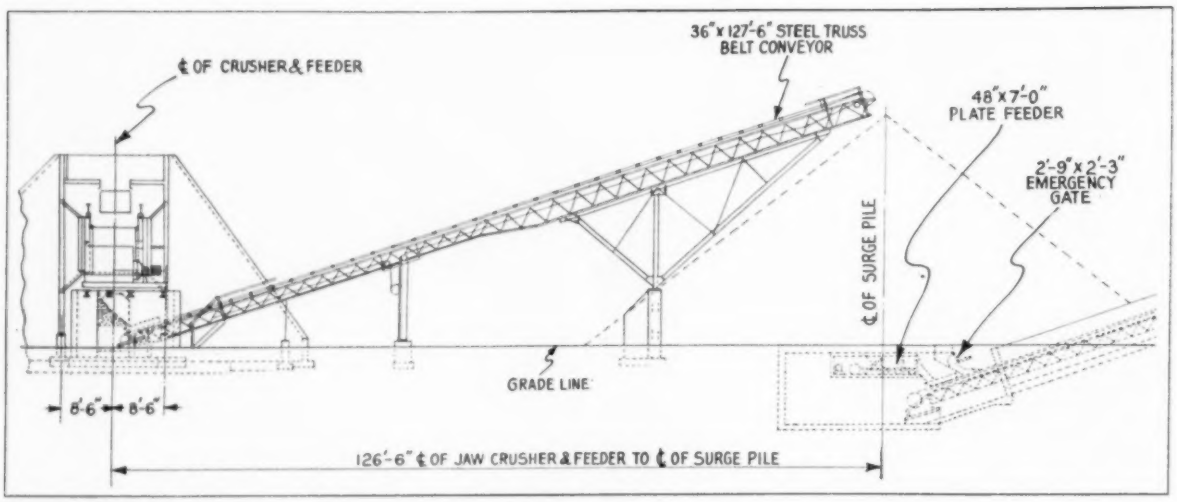


Elevation details of primary crusher and surge pile with reclaiming conveyor, below

was being done by the primary unit due to quarry hold-ups.

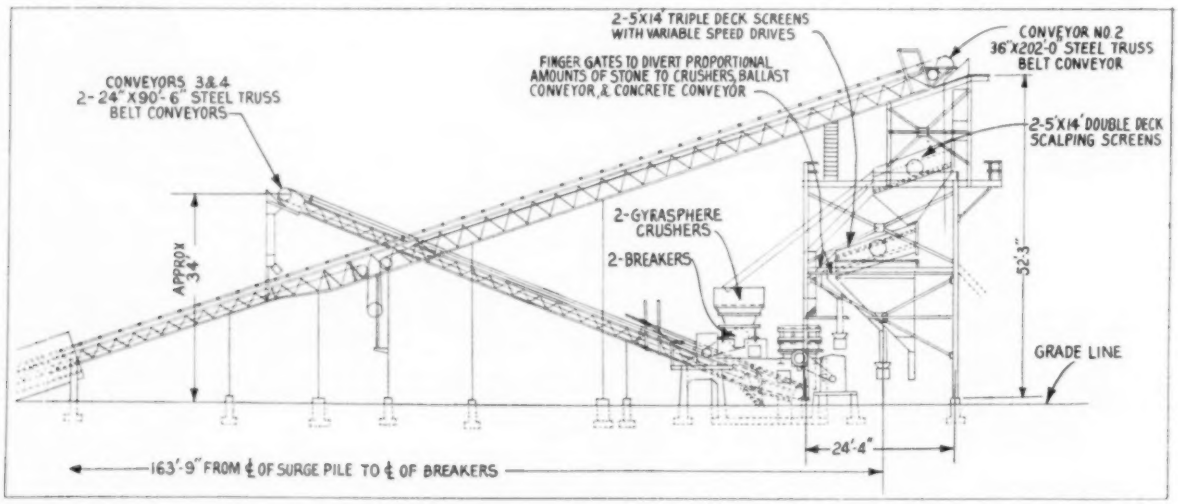
Stone was withdrawn from the surge pile by a 4- x 7-ft. Telsmith heavy-duty plate feeder located in the tunnel under the surge pile. The feeder discharged onto a 36-in. Barber-Greene belt conveyor, 202-ft. centers, operating 400 f.p.m., and was driven by 75-hp. gearmotor. Stone from the head end of the conveyor was split evenly by means of a steel chute to two 5- x 14-ft. Telsmith double-deck, heavy-duty scalping screens which were driven by two 15-hp. motors.

The top decks of the screens were equipped with wire cloth having 5-in. square openings and the bottom decks with 2½-in. openings. Material retained on the top decks was discharged by chute to two 16B Telsmith Gyratory crushers, driven by two D-13000 Caterpillar diesel engines. Material retained on the bottom decks was carried by chute to two Type "S" 48-in. Telsmith Gyrasphere crushers, driven by two D-17000 Caterpillar diesel engines.

Both the 16B Telsmith gyratory crushers and 48-in. Gyrasphere crushers discharged directly onto two 24-in. Barber-Greene belt conveyors, 90-ft. centers, operating at 300 f.p.m., and driven by two 15-hp. motors. These two conveyors delivered material to the 36-in. belt conveyor, 202-ft. centers, providing closed-circuit operation for secondary crushing and screening.

Material passing the bottom decks of the two double-deck screens was discharged by chute to two 5- x 14-ft. Telsmith Vibro-King three-deck screens which were driven by two 15-hp. motors. Each of these screens was equipped with wire cloth having 2-in. square openings on the top decks, 1-in. square openings on the second decks, and ½-in. square openings on the bottom decks.

Material retained on the top decks (minus 2½ in. plus 2 in.) was discharged by chutes to the two 48-in. Gyrasphere crushers. The chutes were so designed that a portion of this size could also be diverted into ballast stone. Material retained on the second decks of the two screens (minus 2-in. plus 1-in. ballast stone) was discharged by chutes to a 30-in. Barber-Greene belt conveyor, 320-ft. centers, which moved the ballast stone to a ground storage system. Material retained on the bottom decks of the two screens (minus 1-in. plus ½-in. concrete stone) was discharged by chutes to a 24-in. Barber-Greene belt conveyor, 120-ft. 6-in. centers, operating at 350 f.p.m., and driven by a 25-hp. motor which elevated the concrete stone to a storage pile. The screen chutes were arranged so that any portion of the concrete stone could be mixed with the ballast stone when desired. The material passing through



Details of secondary crushing equipment and screens at plant in Venezuela, South America

Keeps the Hopper Humming

INTERNATIONAL TD-24 CRAWLER TRACTOR AND SCRAPER hauls raw materials easily, speedily from the pit to the conveyor at the E. W. Coons Company plant in Saginaw, Minnesota.

Fast hauling of raw material keeps production high at Minnesota crushing plant

Day in and day out, even in the roughest weather, the E. W. Coons Company crushing plant at Saginaw, Minnesota, produces over 1,000 cubic yards of sized rock for use in local construction and for railroad ballast.

There's a big reason behind this enviable year round production rate. It's the big INTERNATIONAL TD-24 crawler tractor and scraper used by the Coons Company for pit work.

"With the INTERNATIONAL *TD-24 and scraper hustlin' those heaping loads to the conveyor we have no trouble keeping the hopper full all the time . . . even when the raw rock has to be hauled from the rear of the pit.*

"Those big loads and speed add up to more production for us," says Superintendent Thomas S. Brunner.

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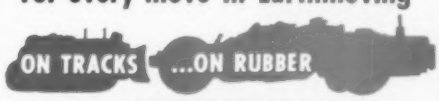

See INTERNATIONAL'S "Job-Phased*" equipment

Diesel engine operating primary jaw crusher has radiator and supercharger located on hill above crusher where there is more air

Diesel-electric generator sets supply power for lighting and auxiliary equipment throughout the plant

the bottom decks of the two screens (minus ½-in. waste) was discharged by chute to an 18-in. Barber-Greene belt conveyor, 120-ft. 6-in. centers, operating at 300 f.p.m., and driven by a 10-hp. motor which elevated the minus ½-in. waste stone to a storage pile. Both the (minus 1 in. plus ½ in.) concrete stone and minus ½-in. waste stone were used for aggregate for concrete construction and concrete block aggregate.

Supply All Power Needs

Because of the plant's location — in a low seepage area — it was necessary to elevate the diesel engines some 10 ft. on individual concrete piers. As a matter of fact, the crushing plant was installed somewhat below the surrounding hill area — partly in a natural low area, partly excavated. This location — determined by its nearness to the granite — necessitated unusual placement of several engine radiator and supercharging systems.

The primary crusher power source, a Caterpillar 375, while located some 30 ft. below the hill line, had its radiator and the air-intake for supercharging mounted on the hill above — where there was better air circulation. This required extensive piping to both units. Moreover, the radiator load was taken off the diesel engine and a 20-hp. electric motor, operating from power house current, was hooked in. Both relieving the engine from radiator-fan operation and supercharging, this arrangement upped the output by about 46 hp., and made this extra power available to the primary crusher.

All conveyor motors were powered from a D-17000 Caterpillar diesel, its radiator also advantageously mounted atop the cut. The plant's relatively small power house furnished lighting and electricity for utility engines. Power house equipment included; a Caterpillar diesel-electric set (D-397), its standby, a D-364 and a D-318 auxiliary night lighting unit.

In the quarry were six portable No. 600 Ingersoll-Rand compressors powered by No. 671 General Motors diesels, and Ingersoll-Rand wagon drills. Two 2½-cu. yd. Bucyrus-Erie diesel shovels were used to clean-up and to

(Continued on page 105)

Surge pile ahead of primary crusher has a total storage capacity of 5500 tons with about 1700 tons live storage. Stone is withdrawn to belt conveyor by plate feeder

Shovel loading one of twenty-four 9.8 cu. yd. end-dump trucks for haulage to primary crusher. As many as 175 truckloads per shift were handled

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New Ford F-700 BIG JOB is the low-cost leader of extra-heavy work. Up to 19,500 lbs. GVW, 34,000 lbs. GCW. New gas-saving, LOW-FRICTION 138-h.p. *Power King* V-8.

New driver comfort cuts trucking costs!

Deluxe Cab shown, extra cost.

New Driverized Cabs cut fatigue! Big, curved, one-piece windshield for better visibility. Exclusive Ford *seat shock snubbers* to level the ride. New non-sag springs. New, free-breathing *woven* plastic upholstery that lasts longer, gives year-'round comfort.

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Helping the driver do a better job saves money by saving valuable truck *time*. What's more, driver comfort is an incentive for safety and for better vehicle care that prolongs truck life, cuts maintenance costs.

Only a Ford Truck gives you full benefit of these savings. For only Ford has the *Driverized* Cab, most comfortable of truck cabs, with its time-saving controls. For complete information, see your Ford Dealer, or write: Ford Division, Ford Motor Co., Dept. T-13, Box 658, Dearborn, Mich.

SAVE WITH ALL THREE!

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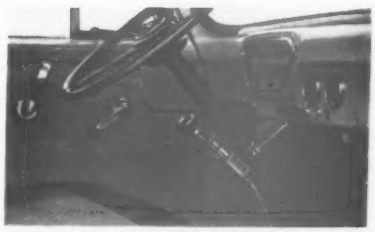
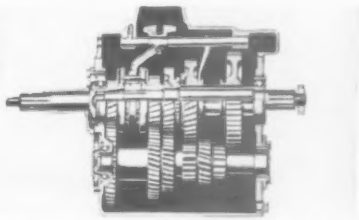
And . . .
Ford Trucks last longer, too!



Electric-shift 2-speed axle has faster, more positive shift action than vacuum type. Convenient button control on gearshift lever.



Synchro-Silent transmission for shifting ease. Four-speed standard, 5-speed direct (shown) or overdrive at extra cost.

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SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Big Quarry—Big Crusher

(Continued from page 102)

load the shuttling Euclid trucks.

Rock came from the face of a nearly seamless mass of granite. This massive formation, with almost no evidence of even "healed" seams, required two blastings daily: one at 6 a.m., and the other at 3 p.m. On an average, Ingersoll-Rand wagon drills put down 350 holes per blast. For the early morning blast, about 700 lb. of dynamite were used; about 800 lb. for daytime detonation, a total of 1500 lb. every 24 hr. Even with this amount of explosive, and despite use of two "coyote" holes plus an average 1½ lb. of dynamite per cu. yd., the rock "broke big."

"It was just plain tough going," reported superintendent Daley. "Keeping ahead of the crushers was a 24-hr., three-shift drilling-blasting-clearing job."

Orinoco Mining Co.'s 1600-hp., 185-ton Baldwin-Lima-Hamilton locomotives regularly hauled as many as forty-eight 50-ton ballast-hopper cars to the crushing plant's two stockpiles (each with a capacity 83,500 cu. yd. — 100,000 tons). And upwards of eight cars were filled hourly. Typical storage piles were loaded-out from bottom-center, via a 30-in. Armco steel pipe-tunnel running 290 ft. to the rail siding. In this tunnel was a conveyor capable of loading 400 t.p.h. The stockpiles were fed by 30-in. belt conveyors, 320-ft. centers, handling 300 t.p.h., emanating from the secondary crusher. Fines, screened out at the crusher, were either sent to Orinoco Mining Co.'s Puerto Ordaz aggregate plant or hauled by the Euclids to various road-surfacing jobs.

Morrison-Knudsen Co. successfully employed native Venezuelan drillers, blasters and crusher plant hands, using only five Americans out of the installation's 54 workers.

A single, 1500-gal. diesel fuel tank was mounted on the hill above the plant, gravity feeding the engines some 30 ft. below. Diesel fuel (about 15¢ a gal.) was trucked the 60 kilometers north from Ciudad Bolivar — main port city on the Orinoco.

This spring, Morrison-Knudsen, which held contracts for both laying the line and building a parallel roadway, finished its two-year contract — part of an overall $250,000,000 being spent on the development by Orinoco Mining. And one reason why Morrison-Knudsen finished on schedule was its quarry-crusher installation — which experienced no major breakdowns despite high humidity and extremely hard material.

The crusher installation was designed by Smith Engineering Works, Milwaukee, Wis. E. Lee Heindenreich, Jr., consulting engineers, Newburgh, N. Y., designed stockpile areas. Dugan Graham was Morrison-Knudsen's project manager.

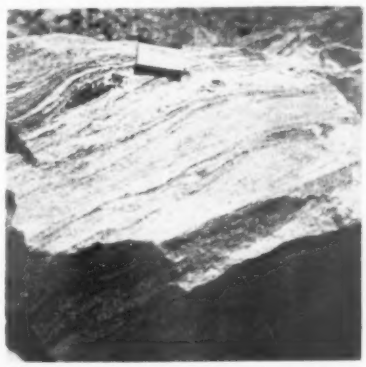
Improve Plant and Quarry

(Continued from page 67)

crusher which originally was a 30- x 42-in. unit but is now classed as a 27- x 42-in. machine. As the stone at the Columbus Rock Co. quarry is hard and tends to break in relatively large fragments even under the best of blasting conditions, stone in the primary crusher tended to bounce. With the crusher running around 225 r.p.m., a stone lodged in the jaws would obviously be squeezed 225 times per minute. If the rock did not move, the wear at that point could be 225 times what it would normally be if the rock did not stay in one spot. The crusher is an eccentric-in-the-head type. To help correct the tendency for stone to bounce in the crusher, the 4-in. corrugated stationary plates were replaced with a 6-in. thick smooth jaw. The angle of the toggle plate was also steepened by redesigning it so that more movement was imparted at the outlet areas. These changes resulted in a flatter angle of nip, and resulted in increasing the life of the jaws from 30,000 tons to 75,000 and also some increase in capacity. When the favorable results of these changes were observed, the company put in a 7-in. thick smooth stationary jaw which is now in service, and it is expected to last for 100,000 tons and permits an increase of from 90 t.p.h. to 135 t.p.h. of the 6-in. discharge size. This puts the primary more in balance with the capacity of the rest of the plant.

A final change related to the sand screw which was moved to enable the recovery of both a wet manufactured sand and a dry sand. The latter is used for bituminous work. An additional sizing screen has been added in the finish end.

All stone at Columbus Rock Co. is washed and delivered by trucks as no railroad serves the plant. However, a short distance from the operation the company has carloading facilities involving a ramp.



Showing banded character of granite in quarry. Size indicated by 4- x 5-in. film pack, above

Micheal Bruni, secretary-treasurer and manager, left, and J. T. Pettigrew, superintendent

The operation in essence consists of the primary crusher, a dry scalper screen between it and the secondary crusher and two final reduction crushers. The secondary crusher was installed after operations had started. Three wet screens do the sizing, and finished material is stockpiled over a reclaiming tunnel, with the exception of the dry manufactured sand. To get the secondary crusher into the circuit, the first general plant layout was changed from an "L"-shape to a "U"-shape wherein one leg of the "U" is shorter than the other. At the place where the primary crusher was first installed plans are pending to use it as a surge pile ahead of the finish section of the plant. The plant uses belt conveyors throughout.

Re-designing of the plant was under the direction of M. M. Schoolfield of Ralph E. Mills Co., Salem, Va. Mr. Schoolfield, now at Gainsville, Fla., is head of the Swanee Limerock Co.

The officers of the Columbus Rock Co. are: M. S. Eddy, president; C. E. Gates, vice-president; W. P. Moss, vice-president; M. A. Bruni, secretary-treasurer and manager; and J. T. Pettrigrew, superintendent. The Columbus Rock Co. is affiliated with the Williams Construction Co., Columbus, Ga.

New Sales Division

NATIONAL GYPSUM Co., Buffalo, N. Y., has established a new Midwest Sales Division with headquarters in Chicago, Ill., which includes sales districts in Milwaukee, Wis., St. Louis, Mo., Minneapolis, Minn., and Chicago, Ill. Jay P. Nicely, formerly general commodity manager at Buffalo, was appointed manager of the new division. The company also plans to establish a Southwest Division district office in Oklahoma City, Okla.

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BULK STORING in U. S. SEALD-BINS requires no warehousing space, either before shipping or while awaiting use. Contents are safe in open storage.

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We call this "closed" materials handling method the U. S. SEALD-BULK System. The unique and thoroughly patented collapsible container that makes it possible is the U. S. SEALD-BIN.

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The U. S. SEALD-BULK System provides totally new opportunities to cut costs of packaging and shipping, reduce man-hours, and eliminate warehousing and loss of materials. For the complete savings story, write or phone for an illustrated descriptive booklet.

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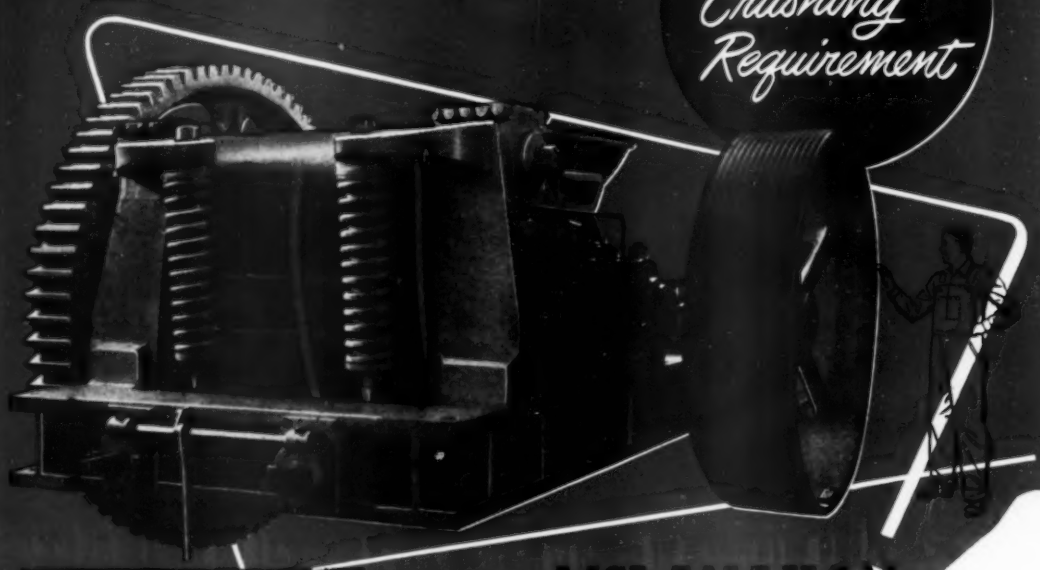
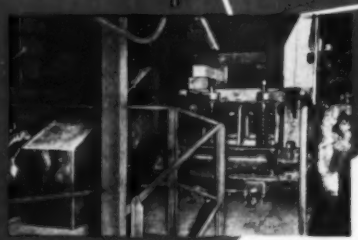
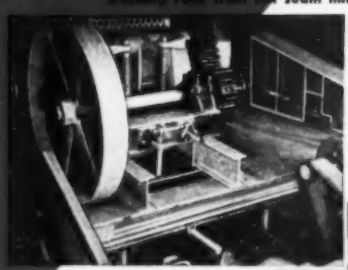




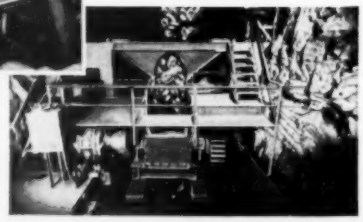
...er used for crushing rock from ... seam mining.

McLANAHAN *Single Roll* ROCKMASTER CRUSHER

Outstanding for both primary and secondary crushing, the Rockmaster produces a minimum of flats, dust and irregular sizes. Self-feeding and equipped with automatic tramp iron protection and quick adjustment, it will take a choke feed without jamming. In operation, the material is held against the crushing plate while it is sledged by the wedge-shaped teeth of the roll until broken and forced through the crusher opening. Interchangeable and reversible crushing plates and quick-change steel segment rolls contribute greatly to economy in maintenance. The Rockmaster has been thoroughly service-proved on limestone, iron and manganese ores, gypsum, rock, gravel, shale, slag and other materials.



...s 30" x 48" Rockmaster ...ushes iron ore in Alabama for the McLanahan Log Washers.



In both primary and secondary crushing the Rockmaster gives a minimum of fines and flats in this Iowa mine.

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Hollidaysburg, Pennsylvania

Write for Bulletin RM-505

This 8-page bulletin includes dimensional drawings, capacity and horsepower data and technical details.

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Effect of Some Inorganic and Organic Compounds On the Solubility, Setting Time and Tensile Strength of

CALCINED GYPSUM

By WALLACE C. RIDDELL*

LITERATURE as far back as the early part of 1900 contains conflicting data on the effect of accelerators and retarders on the physical properties of calcined gypsum, essentially $CaSO_4 \cdot \frac{1}{2} H_2O$. Welch reviewed this in his paper published in November, 1923.[1]

He reviews the chemical process of the setting of plaster and discusses both the "colloidal-gel" theory and the crystallization theory. He also reviews and gives much of the data of Rohland on the effect of accelerators and retarders on the setting time of plaster,[2] and also the data of Traube[3] who published data on the effect of setting time for a large number of both inorganic and organic salts. Fisher recently reviewed the literature in his paper on "The Setting of Gypsum Plaster"[4]. He gives the effect of setting time on plaster for the addition of a 0.2 percent solution of several salts, using 200 gr. of "plaster of Paris" and 100 ml. 0.2 percent solution which is equivalent to approximately 2 lb. per ton of added salt. He also gives plots of "Differential Thermal Analysis of Gauged "Plaster of Paris."

There has been much discussion as to the effect of change in solubility of $CaSO_4 \cdot \frac{1}{2} H_2O$ on the setting time. Little correlated practical data is available on the effect of added salts on the physical properties of calcined gypsum or plaster. We have determined some of this data and this is given in Table 1. For these tests a sample of calcined gypsum, which analyzed 96.7 percent $CaSO_4 \cdot \frac{1}{2} H_2O$, 1.10 percent $CaCO_3$, 1.5 percent insoluble, 0.30 percent R_2O_3, was used; 70 percent normal consistency was used for all strength tests; solubility determinations were made at 25 deg. C.; solubility is reported as grams $CaSO_4$ per 100 ml. solution: setting time tests are somewhat arbitrary but were all made by the same method — using large Gillmore needle with penetration of needle point to O.1 cm. For each set of determinations, a sample of the untreated $CaSO_4 \cdot \frac{1}{2} H_2O$ was tested as a control. Salts were added as follows: 0.25 percent = 5 lb. per ton; 0.50 percent = 10 lb. per ton; 0.75 percent = 15 lb. per ton; 1.0 percent = 20 lb.

(Continued on page 113)

Table 1: Setting Time in Minutes; Tensile Strength p.s.i.;
Solubility = grams $CaSO_4$ per 100 ml. @ 25 deg. C. Weight of salt added in grams per 100 grams plaster or percent

Salt Added Grams	0.25	0.50	0.75	1.00	2.00	Plaster Only 0
NaCl						
Set	22	18	15	10	7	32
Briq. dry wt.	71	70	71	70	68	71
T.S. p.s.i.	255	250	210	200	180	270
Sol. $CaSO_4$	0.793	0.848	0.953	1.087	1.203	0.754
KCl						
Set	20	15	10	8	5	32
Briq. dry wt.	72	71	72	72	71	72
T.S. p.s.i.	260	260	300	280	290	265
Sol. $CaSO_4$	0.821	0.889	0.898	0.921	1.073	0.768
NH_4Cl						
Set	20	15	12	10	7	30
Briq. dry wt.	71	70	71	70	69	71
T.S. p.s.i.	280	260	240	230	200	270
Sol. $CaSO_4$	0.878	0.955	1.289	1.799	1.776	0.770
$BaCl_2 \cdot 2H_2O$						
Set	30	30	30	25	25	30
Briq. dry wt.	73	71	71	72	74	70
T.S. p.s.i.	280	275	230	235	180	260
Sol. $CaSO_4$	0.689	0.660	0.624	0.605	0.599	0.771
$CaCl_2 \cdot 2H_2O$						
Set	30	30	30	30	30	30
Briq. dry wt.	71	72	72	71	72	73
T.S. p.s.i.	270	255	210	190	165	290
Sol. $CaSO_4$	0.580	0.577	0.554	0.505	0.503	0.760
$MgCl_2 \cdot 6H_2O$						
Set	30	25	25	25	20	30
Briq. dry wt.	71	72	72	71	72	72
T.S. p.s.i.	290	240	220	200	190	290
Sol. $CaSO_4$	0.817	0.887	0.948	1.050	1.165	0.752
$NaNO_3$						
Set	28	23	20	15	12	32
Briq. dry wt.	73	72	72	73	73	72
T.S. p.s.i.	285	270	280	290	290	270
Sol. $CaSO_4$	0.824	0.897	0.900	0.978	1.112	0.756
KNO_3						
Set	20	20	15	12	8	30
Briq. dry wt.	71	72	71	70	70	72
T.S. p.s.i.	270	250	240	240	230	280
Sol. $CaSO_4$	0.791	0.856	0.878	0.911	0.974	0.762
NH_4NO_3						
Set	23	20	17	15	12	32
Briq. dry wt.	73	71	71	71	70	72
T.S. p.s.i.	280	290	310	265	210	280
Sol. $CaSO_4$	0.880	0.952	0.989	1.046	1.225	0.765
$Ba(NO_3)_2$						
Set	35	30	30	30	25	35
Briq. dry wt.	72	73	73	72	74	71
T.S. p.s.i.	280	365	360	310	265	280
Sol. $CaSO_4$	0.729	0.695	0.619	0.614	0.606	0.766
$Ca(NO_3)_2$						
Set	35	35	35	37	37	35
Briq. dry wt.	69	69	70	70	70	70
T.S. p.s.i.	255	250	250	225	200	260
Sol. $CaSO_4$	0.705	0.688	0.659	0.607	0.582	0.768
Na_2SO_4						
Set	20	15	15	10	7	30
Briq. dry wt.	71	71	71	72	71	72
T.S. p.s.i.	265	265	260	245	210	280
Sol. $CaSO_4$	0.890	0.803	0.685	0.637	0.589	0.762
K_2SO_4						
Set	16	12	10	8	6	32
Briq. dry wt.	71	71	72	72	72	71
T.S. p.s.i.	250	260	270	280	285	260
Sol. $CaSO_4$	0.706	0.684	0.645	0.599	0.471	0.765
$(NH_4)_2SO_4$						
Set	20	15	12	8	6	32
Briq. dry wt.	73	72	72	71	72	73
T.S. p.s.i.	280	275	265	255	260	280
Sol. $CaSO_4$	0.754	0.737	0.713	0.713	0.667	0.770
$MgSO_4 \cdot 7H_2O$						
Set	30	25	25	25	20	30
Briq. dry wt.	70	71	70	70	70	71
T.S. p.s.i.	260	290	260	265	245	260
Sol. $CaSO_4$	0.740	0.732	0.700	0.690	0.705	0.766
$CaSO_4 \cdot 2H_2O$						
Set	15	15	10	7	7	30
Briq. dry wt.	72	72	71	71	72	72
T.S. p.s.i.	260	265	255	260	265	265
Sol. $CaSO_4$						0.765

*Chemical engineer, Kaiser Gypsum Co., Oakland, Calif.

[1]F. C. Welch, U. S. Bureau of Standards, **Journal of American Ceramic Society**, Nov. 1923.
[2]Rohland, **Zeits. fur Elek** 14-421-1908.
[3]Traub, **Koll Zeit.** 25, 62-1919.
[4]H. C. Fisher, **A.S.T.M. Bulletin**, Sept., 1953.

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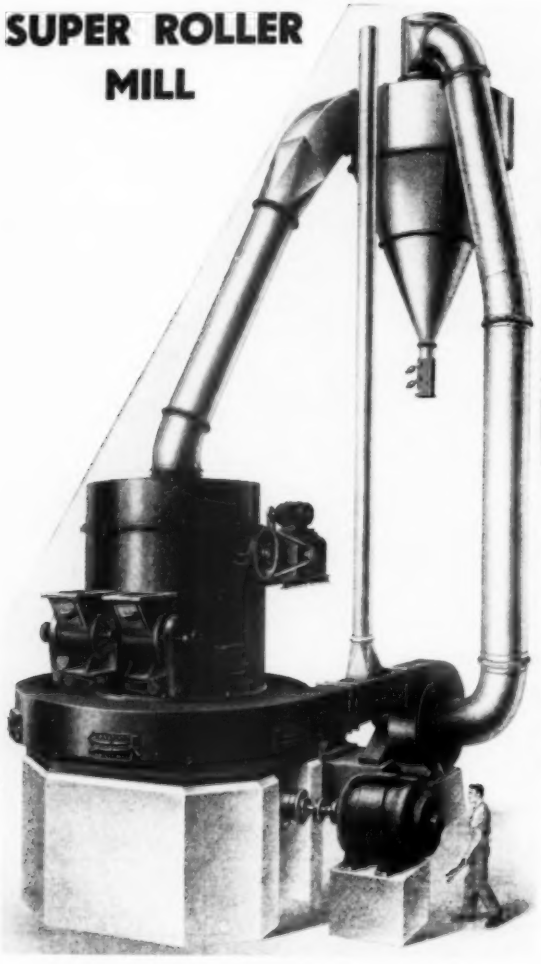

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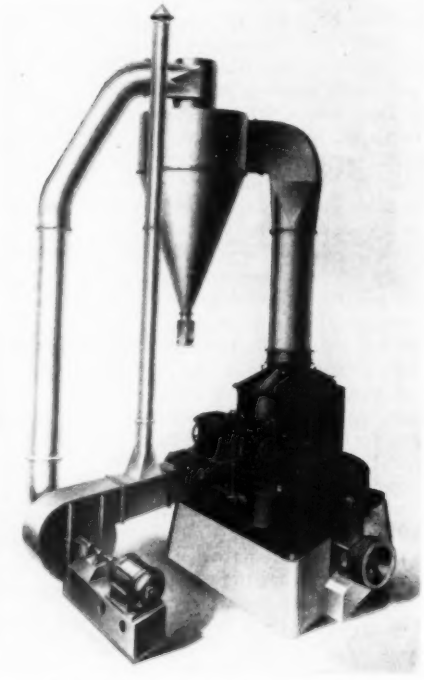

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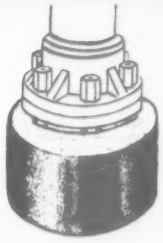
THE superior performance of Raymond Roller Mills is due to the many improvements developed during sixty years of service to the non-metallics industry. They are noted for flexibility in control, ease of adjustment, uniformity in production and economy in operation.

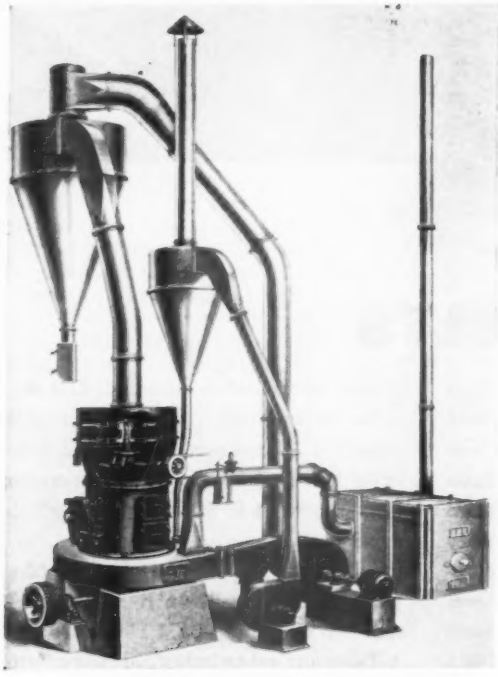
The pneumatic feed control increases efficiency by maintaining a maximum "load" on the mill under all conditions. The special lubrication system, high-grade bearings, and extra sturdy construction, all contribute to record low maintenance costs. Many advances in design have reduced wear in mill parts and lowered power consumption.

Whatever your grinding problem may be, Raymond equipment and engineering service offer you an economy-proved method of production.



Raymond Oil Journal simplifies lubrication and reduces maintenance.

HIGH SIDE ROLLER MILL



WITH FLASH DRYING SYSTEM

For removing surface moisture from the material during the pulverizing operation.

WHIZZER SEPARATION

An Exclusive Feature of Raymond Mills

The patented Whizzer is built as an integral part of the Raymond Mill Air Separator. The revolving blades set up counter air currents that effectively sweep out the fines and reject the oversize material, insuring a consistently uniform product.

The Whizzer unit is driven by an independent motor through a variable speed transmission. Changes can be made by one simple adjustment while the mill is running. This provides a wide range of fineness control in making various grades of material.

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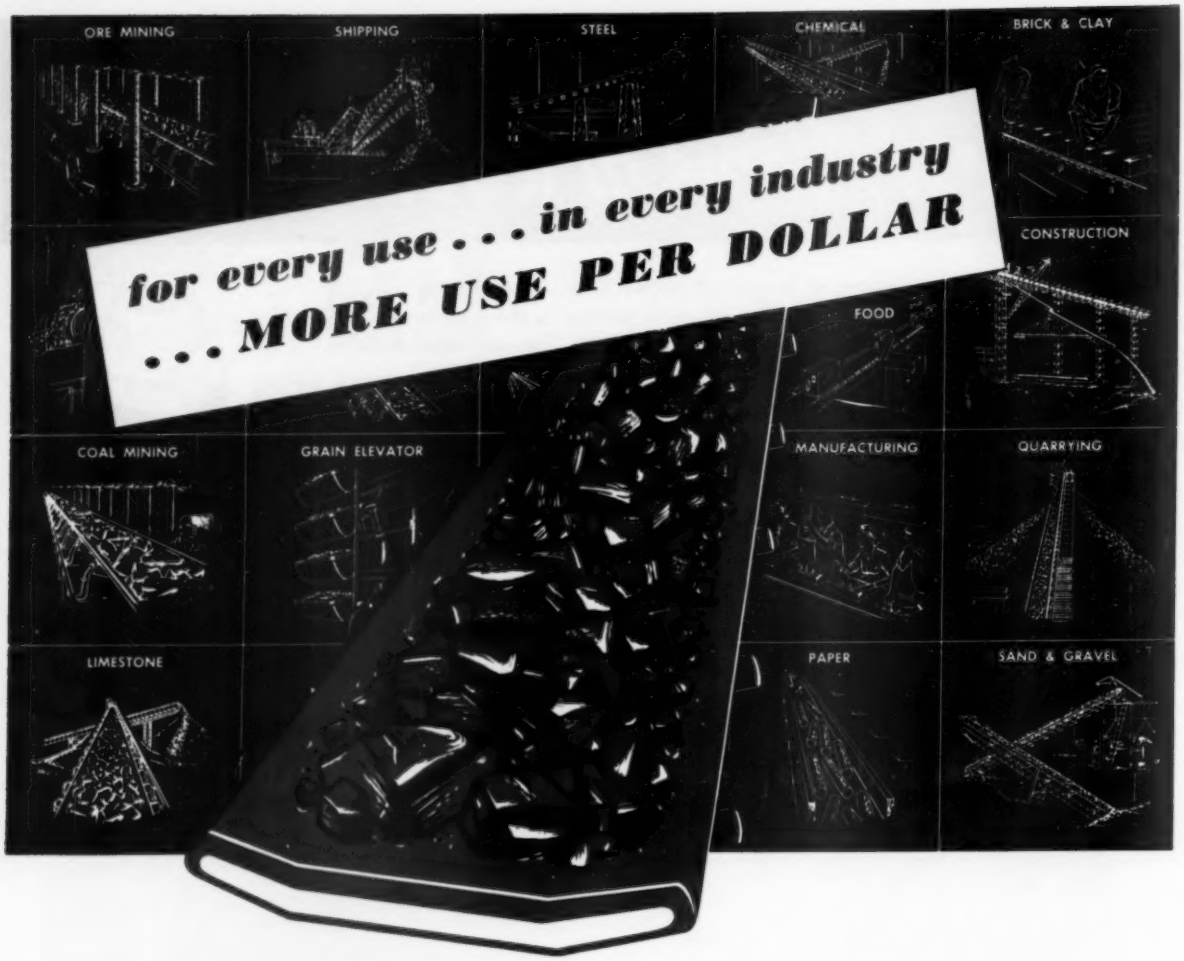

R/M CONVEYOR BELTS

If conveyor belts are your problem, turn to Raybestos-Manhattan. There are R/M Conveyor Belts with extra cushion for heavy shock loading. R/M Conveyor Belts for mining, quarrying, or bulk materials are unequalled for natural troughing, flexibility and long life. The latest exclusive development of R/M engineers is the "XDC" cover which protects heavy duty conveyor belts against wear, abrasion, cuts and tears to a degree never before attained. Hot material, high tension, long lift, oil or non-spark conditions . . . all are met with special R/M Conveyor Belt designs. Equally good engineering goes into R/M Belts for light duty . . . packages, parts, cases or wood chips. For every use R/M Conveyor Belts give you More Use per Dollar. Consult an R/M representative. Ask him also about R/M Hose, Transmission, V-Belts and other industrial rubber products.

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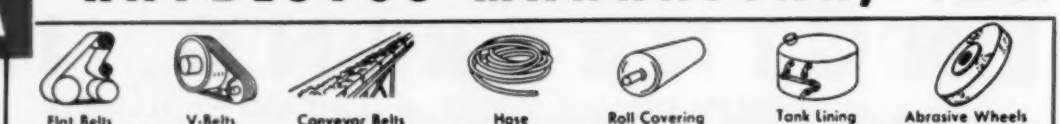
RAYBESTOS-MANHATTAN, INC.



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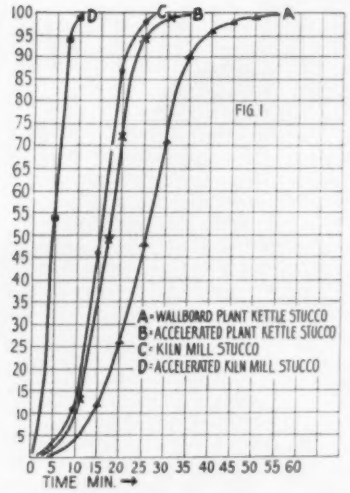


FIG. 1
A = WALLBOARD PLANT KETTLE STUCCO
B = ACCELERATED PLANT KETTLE STUCCO
C = KILN MILL STUCCO
D = ACCELERATED KILN MILL STUCCO
TIME MIN.

Fig. 1: Rates of rehydration of calcined gypsum made by different methods

Calcined Gypsum Studies

(Continued from page 109)

per ton; and 2.0 percent = 40 lb. per ton of plaster.

Solubility Determinations

Solubility determinations were made by precipitation of either the SO_4 or the Ca ion.

In actual practical use, the acceleration of set of plaster is much more effective than shown in Table 1 for several of the salts used such as NaCl, KCl, K_2SO_4, $(NH_4)_2$, SO_4, $CaSO_4 \cdot 2H_2O$ (selenite crystals) and salts which hydrolize with water to give an acid reaction such as $Al_2(SO_4)_3$ etc.

We have also determined the rates of rehydration of calcined gypsum made by different methods and a few of these results are shown in Fig. 1.

The calorimeter used was a modified old type Parr, and the calorimeter correction was determined with ZnO + HCl, NaOH + HCl and with a pure sample of beta $CaSO_4 \cdot \frac{1}{2} H_2O$ under exactly the same conditions as obtained for the experimental data on rehydration rates, using 100 gr. plaster, 100 gr. distilled H_2O and accelerators as noted; 3-in. immersion thermometers graduated to 0.1 deg. C. and reading glass effective to 0.05 deg. C. The heat of hydration of fine beta $CaSO_4 \cdot \frac{1}{2} H_2O$ is 4600 calories per gram formula weight, equal to 3180 calories per 100 grams. The specific heat of $CaSO_4 \cdot 2 H_2O$ is 0.259 at 25 deg. C. and 0.268 at 40 deg. C. calories per gram.

The calorimeter data was primarily used to measure the rate of rehydration or crystallization of wallboard slurry mixes and the effect of various types of accelerators. It is an easily adapted and quick method for this

(Continued on page 117)

Na_3PO_4						
Set	1:15 hrs.	3:00	5:00	10:00	18:00	35 min.
Brlq. dry wt.	72	72	71	71	71	72
T.S. p.s.i.	180	110	90	70	60	270
Sol. $CaSO_4$	0.863	1.045	1.190	0.935	0.542	0.760
$(NH_4)_3PO_4$						
Set	1:00	2:00	4:00	7:00	15:00	32 min.
Brlq. dry wt.	71	71	70	71	71	71
T.S. p.s.i.	215	200	180	170	150	280
Sol. $CaSO_4$	0.486	0.428	0.532	—	0.518	0.759
KOH						
Set	15 min.	10	7	5	4	30 min.
Brlq. dry wt.	74	71	72	71	72	72
T.S. p.s.i.	255	245	245	230	200	270
Sol. $CaSO_4$						0.764
$Ca(OH)_2$						
Set	23	20	17	21	21	30
Brlq. dry wt.	71	71	71	72	72	71
T.S. p.s.i.	280	310	310	300	270	275
Sol. $CaSO_4$	0.736	0.719	0.719	0.720	0.722	0.760
$Ba(OH)_2$						
Set	30	30	30	35	35	30
Brlq. dry wt.	71	73	73	72	73	71
T.S. p.s.i.	280	260	255	285	235	280
Sol. $CaSO_4$						0.776
Na_2CO_3						
Set	30	30	30	30	25	32
Brlq. dry wt.	71	72	71	72	70	71
T.S. p.s.i.	210	75	85	110	90	260
Sol. $CaSO_4$	0.987	1.673	2.120	2.410	3.530	0.753
$(NH_4)CO_3$						
Set	35	37	40	40	50	35
Brlq. dry wt.	68	68	68	66	45	70
T.S. p.s.i.	195	145	105	60	30	265
Sol. $CaSO_4$	0.892	1.060	1.218	1.405	1.820	0.763
$NaHCO_3$						
Set	35	40	50	30	25	30
Brlq. dry wt.	70	68	65	59	54	71
T.S. p.s.i.	230	170	105	80	65	260
Sol. $CaSO_4$	0.862	0.966	1.915	1.728	1.763	0.760
$Na_2B_4O_7$						
Set	30	35	40	1:15	7:00 hrs.	32
Brlq. dry wt.	72	73	72	72	79	73
T.S. p.s.i.	300	295	290	220	155	275
Sol. $CaSO_4$	0.847	0.889	0.890	0.878	0.868	0.769
$H_2B_4O_7$						
Set	25	26	28	27	34	30
Brlq. dry wt.	71	72	71	72	71	71
T.S. p.s.i.	250	250	200	200	190	270
Sol. $CaSO_4$	0.994	1.231	1.399	1.582	2.171	0.763
HCl						
Set	10	8	7	5	3	35
Brlq. dry wt.	65	65	62	61	61	70
T.S. p.s.i.	158	110	85	65	60	255
Sol. $CaSO_4$	0.994	1.231	1.399	1.582	2.171	0.763
H_2SO_4						
Set	22	25	25	20	20	35
Brlq. dry wt.	69	66	62	62	59	70
T.S. p.s.i.	240	220	185	185	170	260
Sol. $CaSO_4$	0.559	0.548	0.545	0.532	0.465	0.764
$NaHSO_4$						
Set	25	20	15	10	5	30
Brlq. dry wt.	72	70	70	70	66	71
T.S. p.s.i.	275	205	210	200	195	280
Sol. $CaSO_4$	0.808	0.753	0.585	0.560	0.465	0.754
H_3PO_4						
Set	1:30 hr.	50	50	50	45	35 min.
Brlq. dry wt.	63	61	60	58	54	70
T.S. p.s.i.	175	170	145	125	120	255
Sol. $CaSO_4$	0.793	0.831	0.870	0.905	1.026	0.764
$H_2C_2O_4$						
Oxalic acid						
Set	30	20	20	20	15	35
Brlq. dry wt.	68	70	70	69	69	73
T.S. p.s.i.	210	235	225	200	200	270
Sol. $CaSO_4$	0.972	1.25	1.55	1.83	2.91	0.762
$C_6H_8O_7$						
Citric acid						
Set	8:00 hrs.	16:00	16:00	12:00	3:30	32 min.
Brlq. dry wt.	72	73	60	60	55	73
T.S. p.s.i.	80	80	60	80	50	280
Sol. $CaSO_4$	0.750	0.768	0.764	0.771	0.781	0.748
$C_4H_6O_6$						
Tartaric acid						
Set	35	40	35	30	30	30
Brlq. dry wt.	73	72	73	72	73	72
T.S. p.s.i.	245	225	225	270	270	280
Sol. $CaSO_4$	0.796	0.818	0.804	0.827	0.855	0.765
$C_{14}H_{10}O_9$						
Tannic acid						
Set	3:00 hrs.	6:00	12:00	24:00	48:00	30 min.
Brlq. dry wt.	73	72	72	71	71	73
T.S. p.s.i.	270	200	185	170	110	280
Sol. $CaSO_4$	0.755	0.745	0.719	0.712	0.695	0.764
Retarder (1) 35%						
Keratin						
Set	12:00 hrs.	48:00	7 days	35 days	48 days	32
Brlq. dry wt.	75	74	72	High shrinkage		73
T.S. p.s.i.	180	175	180	No test		280
Sol. $CaSO_4$	0.724	0.716	0.699	0.688	0.678	0.766
$C_6H_{12}O_6$						
Dextrin C.PCo #152						
Set	30 min.	30	30	30	30	32
Brlq. dry wt.	71	73	72	72	71	72
T.S. p.s.i.	310	280	300	280	240	285
Sol. $CaSO_4$	0.709	0.710	0.711	0.715	0.715	0.760
$C_{12}H_{22}O_{11}$						
Cane Sugar						
Set	32	30	32	35	35	32
Brlq. dry wt.	72	73	73	73	73	71
T.S. p.s.i.	275	280	320	325	340	270
Sol. $CaSO_4$	0.756	0.713	0.743	0.744	0.735	0.768

We torture truck axles to

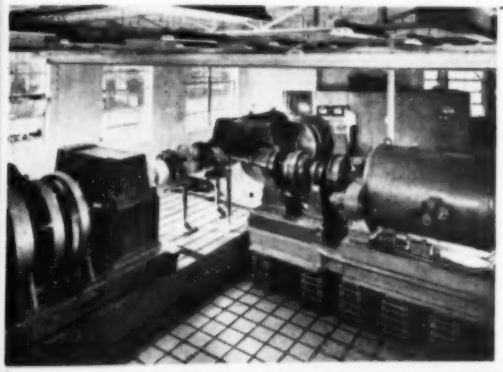
in the new Timken-Detroit indoor proving ground ...and only Timken has it!

We shock-load, abuse, and torture them. Match every conceivable hauling condition. Then add a few brutal tricks of our own!

Why? So you'll know in advance, and *for sure*, that a Timken-Detroit axle can take the punishment it was designed for. More rugged, grueling punishment than any other axle made!

To prove it, we capsuled a multi-thousand acre proving ground into one room. Here our engineers can put 50 years of experience in building axles for trucks, buses and trailers to work—subjecting axles and gearing *indoors*, to any *outdoor* operating condition.

Such exacting research pays off for you in: longer axle life; less maintenance, repairs and downtime; reduced operating expenses. This is why Timken-Detroit axles are preferred by manufacturers and operators everywhere.



How TDA proves axle quality in this "Torture Chamber"

We pick one of our axles at random . . . then duplicate a hauling condition, hour after hour, day after day . . . simulating half a million miles of the toughest driving situations in just a few days. Or "invent" a test like going uphill with a full load from California to New York nonstop. There is no other axle testing like it in the world!

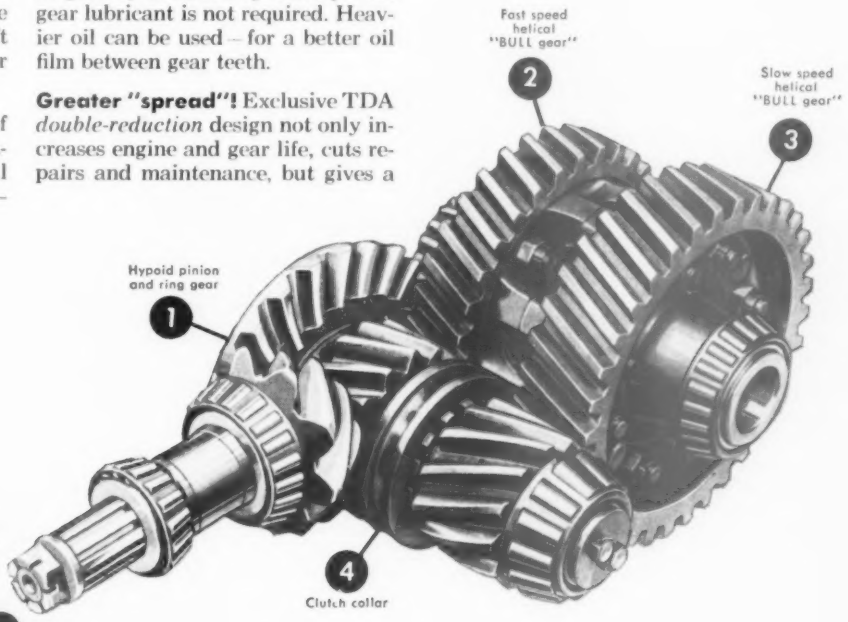
This is our "truck driver." He works in our "Torture Chamber." Above him are graphs showing speed and torque performance under any operating condition he chooses . . . soft ground at full load . . . mountains . . . express highways or side roads. With special dials, recorders and electronic devices, he actually *drives* the axle with scientific accuracy from his chair!

How Timken-Detroit 2-speed axles with man-size gears, operate in any gear ratio ...indefinitely, without overheating!

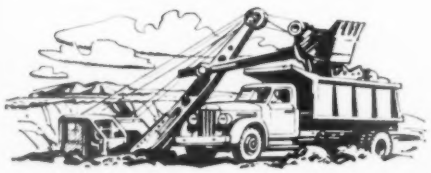
The secret? A husky hypoid ring gear and bigger, stronger pinion set (No. 1 in illustration) provides the *first step* of the total gear reduction for both fast and slow ratios. Two large, heavy-duty helical gear sets provide the *second step*. Both sets are of equal size and capacity—but one set (No. 2) is for fast speed—the other (No. 3) is for slow speed. The clutch collar (No. 4) moves to left or right to engage one "BULL gear" or the other.

The result: Complete elimination of small, complicated parts and midget-size gears! Larger hypoid-helical design gives more teeth in contact—reducing load per unit of contact area—for more positive, quiet operation. Bearings are larger. There's longer motor and truck life because wear on driving parts is less. When you divide the total gear reduction, you double its life expectancy. And the set of "BULL gears" not in use, always idles at greatly reduced speed. Special gear lubricant is not required. Heavier oil can be used—for a better oil film between gear teeth.

Greater "spread"! Exclusive TDA *double-reduction* design not only increases engine and gear life, cuts repairs and maintenance, but gives a vastly greater gear ratio "spread" for all jobs requiring any range of speed or power. A fast gear ratio for light loads everywhere—full loads on the level. Slow speed ratio for full loads on hills—for better pulling in "soft going."



death



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ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN

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"TORTURE-TESTED"
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WORLD'S LARGEST MANUFACTURERS OF AXLES FOR TRUCKS, BUSES AND TRAILERS

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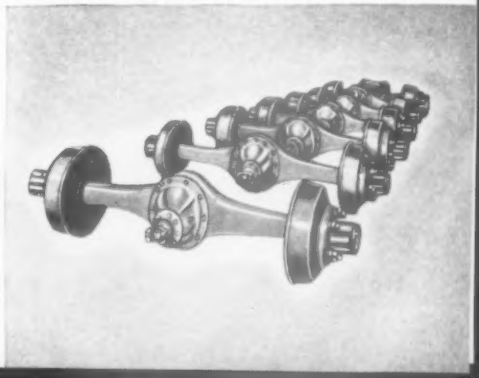
7 basic axle capacities! Only TDA, world's largest manufacturers of truck, bus and trailer axles offers a family of 7 basic axle capacities, each with *interchangeable* final drives: single-speed, single-reduction, single-speed double-reduction, and two-speed double-reduction, using the same axle shafts and housing. Nowhere is there such a selection to fit all special needs.

Exclusive "Torsion-Flow" shafts! Forged so that grain structure of steel conforms to shaft profile, thus assuring uniform distribution of stresses. Exclusive heat-treating formula provides a resilient axle shaft core graduated to a tough, hard outer surface—the ideal combination for axle shaft life. And TDA "Torsion-Flow" shafts are guaranteed for 100,000 miles or 3 years—whichever occurs first.

Hot-forged steel housings! Pound for pound the strongest, most rigid ever built! Rectangular TDA housing shape gives maximum strength, uniform stress distribution, minimum weight. Ask about the TDA "Life of Vehicle" guarantee.



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OR

FINE AS DRIVEN SNOW

RAYMOND Multiwall Shipping Sacks are made with the strength and other protective properties required by a very wide range of industrial products; made to keep the contents *in* and foreign elements *out;* to deliver each commodity clean and safe to destination.

Call in a Raymond man for a constructive analysis of all your package needs. He knows that businesses *are* different and he is fully qualified to advise the type of Raymond Shipping Sack adapted to your special needs. He may even suggest a means of cutting your container costs.

Naturally we prize the continued good will of a customer far more highly than a one-time order. We think you know what we mean. THE RAYMOND BAG COMPANY, Middletown, Ohio. Phone 2-5461.

Raymond

MULTIWALL PAPER SHIPPING SACKS

$(C_6H_{10}O_5)_x$ Starch						
Set	32	32	32	35	35	32
Briq. dry wt.	74	71	72	72	73	73
T.S. p.s.i.	310	280	270	300	305	280
Sol. $CaSO_4$	0.758	0.756	0.759	0.759	0.764	0.771
$C_3H_8O_3$ Glycerol						
Set	35	35	32	35	32	35
Briq. dry wt.	72	69	69	68	66	70
T.S. p.s.i.	280	255	245	240	190	255
Sol. $CaSO_4$	0.729	0.737	0.744	0.748	0.754	0.764
$(NH_4)_2C_2O_4$ Am. Oxalate						
Set	22	17	15	11	7	35
Briq. dry wt.	70	71	70	71	70	70
T.S. p.s.i.	240	225	250	250	230	255
Sol. $CaSO_4$	0.938	1.112	1.292	1.504	2.263	0.763
$NaKC_4H_4O_6$ Rochelle salt						
Set	1:15 hr.	1:00	55	40	35	35
Briq. dry wt.	72	72	69	69	68	72
T.S. p.s.i.	270	270	210	220	230	280
Sol. $CaSO_4$	0.868	0.960	1.046	1.139	1.534	0.752

Calcined Gypsum Studies

(Continued from page 113)

particular application. It should be noted that for ordinary calcined gypsum, the heat of rehydration of essentially beta $CaSO_4 \cdot \frac{1}{2} H_2O \rightarrow CaSO_4 \cdot 2H_2O$ can be measured quite accurately up to approximately 98 percent, but as Southard[5] has pointed out the complete rehydration of alpha $CaSO_4 \cdot \frac{1}{2} H_2O$ is a very slow reaction beyond the point of approximately 95 percent hydration.

That the rehydration or setting of calcined gypsum, $CaSO_4 \cdot \frac{1}{2} H_2O$, to form $CaSO_4 \cdot 2 H_2O$ is an autocatalic reaction can be shown by plotting the solubility of $CaSO_4$ versus time. This data is shown in Fig. 2 for kettle-calcined gypsum, essentially $CaSO_4 \cdot \frac{1}{2} H_2O$ + 10 percent soluble anhydrite, $CaSO_4$. The setting time of this material (by Gillmore needle test) was 35 min., and at this time the plot shows the solubility of $CaSO_4$ at 0.50, or approximately half rehydrated.

The solubility of the calcined gypsum was 0.855 at 25 deg. C., and the solubility of $CaSO_4 \cdot 2 H_2O$ at 25 deg. C. is 0.209 grams of $CaSO_4$ per 100 ml.

[5]J. C. Southard, U. S. Bureau of Mines, Technical Paper 625.

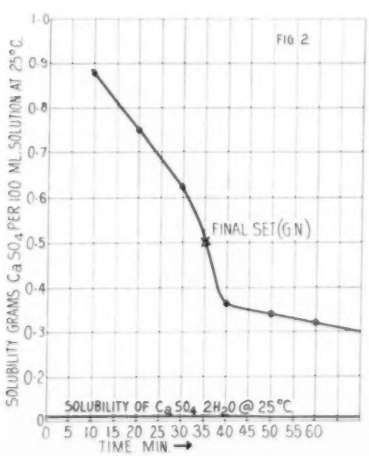


Fig. 2: Solubility of calcined gypsum vs. setting time. Data indicates setting of gypsum is an autocatalic reaction

Rotary Lime Kilns

(Continued from page 90)

To what extent stratification can occur is demonstrated by Fig. 5, presenting a gas analysis taken across the kiln outlet. The lower the stream, as long as it is not diluted by inleaking air, the higher the CO_2 and the lower sample taken at *E* contained more than twice the CO_2 of the upper sample taken at *B*. As the source of CO_2 was the limestone, it would have been far heavier than the upper stream of gases on just this account.

In addition to this, and particularly in the preheating zone where the stone is cold, the lower stream will be cooler, an additional reason for being heavier than the upper stream. It is desired to have the hot gases contact the stone which is as unreasonable to expect as that light oil should supplant heavier water in a bottle.

A further belief exists that, particularly at low kiln capacities, there is a counterflow. The low heavier stream of gases flow part way at least down rather than up the kiln. This frequently occurs in ducts where the thermal head out-balances the velocity head.

Another case concerns the planetary lime coolers. It may be frequently noticed, in the case of a simple rotary kiln, that when draft at the hood is low, there is an upflow of air at the low point, and at the upper point an outflow of gas. The reason for this is the hydrostatic head, easily measurable with a sensitive draft guage. See Fig. 6, "A".

This very thing occurs in part or in full in the case of planetary coolers. Assuming that the temperature of air coming from the coolers is 1000 deg. F. and the difference in height is 15 ft., the difference in draft will be .14 in. w.g. See Fig. 6, "B".

It is through the draft prevailing in the hood that the air is brought in through the cooler, and there must be sufficient draft to confer the required velocity to the air stream to overcome the rather high flow resistance of the units. The units will not function equally. More air will pass through them when at the low point and less while traversing the high position. The flow may be rather sluggish or even completely interrupted when the unit is at the high point. Thorough draft surveys, both gross and micrometric, if interpreted as to cause and result, are not only extremely interesting but almost always prove very profitable and lead toward higher capacity.

Gypsum Production

DOMESTIC MINE PRODUCTION of crude gypsum amounted to 7,909,386 short tons in 1953, or 2 percent below the 8,070,079 tons reported for 1952, as reported by the Bureau of Mines. Production gains and losses among the gypsum products were irregular, with marked gains being shown for sanded plaster, other building plasters, plate glass and terra-cotta plasters, fillers and unclassified uncalcined products, and sheathing board, while prepared finishes were down 17 percent and several other building products down as much as 9 percent. Lath production increased 5 percent; wallboard and laminated board increased 9 percent.

	Short Tons	
	1953	1952
Crude gypsum:		
Mined	7,909,386	8,070,079
Imported	3,191,732	3,067,905
Calcined gypsum produced	7,173,200	6,870,161
Gypsum products sold or used:		
Uncalcined uses:		
Portland cement retarder	1,813,401	1,693,074
Agricultural gypsum	541,430	583,492
Fillers and unclassified	26,624	23,278
Industrial uses:		
Plate-glass and terra-cotta	61,171	48,577
Pottery plasters	43,958	43,991
Dental and orthopedic plasters	10,638	11,037
Other industrial uses	138,339	148,938
Building uses:		
Plasters:		
Base-coat	1,727,136	1,904,260
Sanded	300,567	180,047
To mixing plants	11,437	11,583
Gauging and molding	168,529	176,941
Prepared finishes	12,098	14,544
Other building plasters	324,422	220,447
Keene's cement	49,033	52,593
*Lath	2,435,307	2,314,555
*Wallboard	3,598,755	3,312,544
*Sheathing	131,193	117,381
*Tile and miscellaneous	26,649	27,044

*M sq. ft.

Seated, left to right, may be seen: Harry E. Bender, director; Stanton Walker, engineering director; John W. Murphy, president of National Sand and Gravel Association; and Vince P. Ahearn, executive secretary, standing

• Improving the safety record, percentage depletion, group insurance, labor, public relations, research and technical problems discussed in meetings at the Manoir Richelieu, Murray Bay, Quebec, Canada

Sand-Gravel and Ready-Mixed Concrete Associations' Directors Meet in Canada

MANY MEMBERS of the Boards of Directors of the National Sand and Gravel and National Ready-Mixed Concrete Associations traveled far to attend the Board meetings August 25 and 26 at the Manoir Richelieu, Murray Bay, Quebec, Canada. Nevertheless, the attendance was one of the best on record, and possibilities for enjoyment were many, not withstanding two full days devoted to the consideration of various problems facing the industry and the associations which represent them. As at similar summer or fall meetings in recent years most of the members of the two Boards were accompanied by their wives and in some instances by their children. The meeting included a trip down the St. Lawrence and up the Saguenay River and return, which practically the entire group included in their itinerary.

A separate full session of the board of directors of N.S.G.A. heard reports of the association staff and of the several of the committees, which were followed by discussions of several topics of special interest.

President John W. Murphy opened the meeting by summing up some of the current activities and pointing toward some of the more important fields requiring association attention. Among the latter, he stressed the need for improving the industry's safety record for stepping up efforts to develop better public relations for the sand and gravel industry. The industry and the association have made good progress in 1954, he said, and membership has increased. Mr. Murphy paid tribute to the Washington staff for its good work and to various committees and the Manufacturers Division for their contributions and cooperation. A very excellent financial report was read by executive secretary V. P. Ahearn.

Chairman J. Rutledge Hill of the Committee on Taxation reviewed the status on percentage depletion. He reminded that there will be a new Congress in Washington next year and said that the membership will be called upon at the proper time to make contacts with the key men insofar as percentage depletion is concerned. The association has made many friends in Washington through its efforts on percentage depletion, he said, and he is optimistic about the possibility of having the tax benefit increased in the future over the 5 percent now applied to sand and gravel.

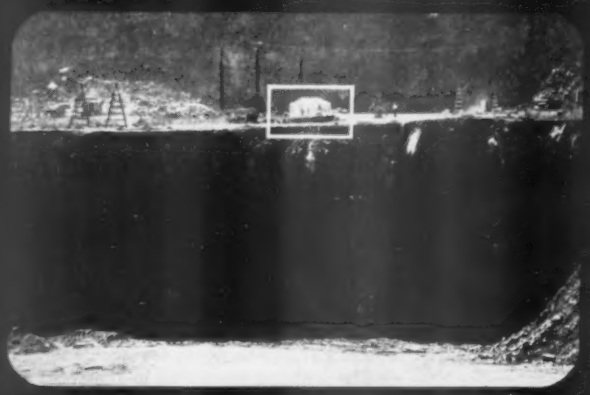
Robert Mitchell offered a resolution expressing endorsement of the program of the association with respect to percentage depletion and requesting the cooperation and help of the membership in furthering that program. He expressed the opinion of the group that the gaining of percentage depletion is one of the greatest achievements of the association not alone for the money benefits but because of the prestige gained for the industry. He warned that percentage depletion cannot be accepted as certain to be maintained, but that eternal vigilance and team work will be required to insure that the benefits be maintained.

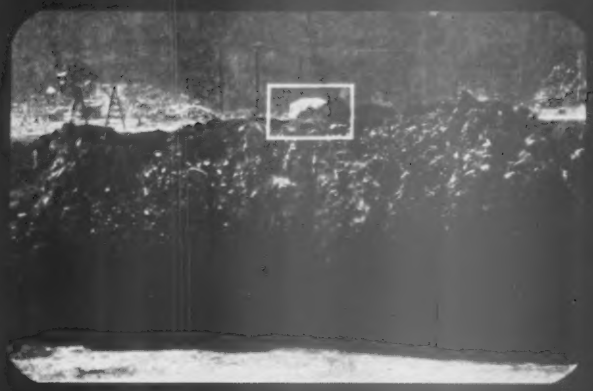
H. V. Owens believes it to be a very impressive approach that individual companies play up the importance of their industry to their respective local communities.

V. P. Ahearn told how the association supported provisions in the 1954 Revenue Act that granted 15 percent depletion to producers of chemical and metallurgical grade limestone for whatever use, which it considered valid for sand and gravel as well, and of the favorable reaction on Congress to the approach taken. More recently, percentage depletion has been reduced to five percent for chemical and metallurgical stone when sold for other use but 15 percent is permitted when sold in competition with rock asphalt.

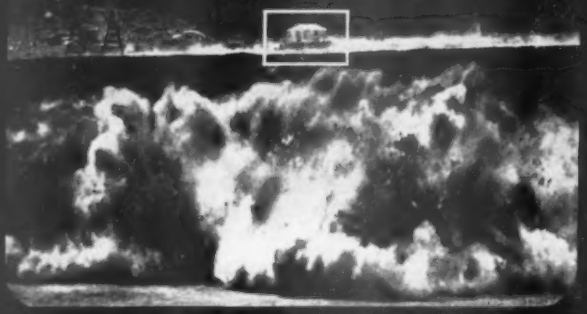
Stanton Walker, director of engineering, discussed a number of current matters with respect to research and technical problems. In his comments on specifications he cited the importance of A.S.T.M. in setting the pattern for most all requirements. On the subject of alkali reactivity in concrete, he said that the burden of proof is on the industry. Recent Corps of Engineers guide specifications have taken a more realistic view, he said, and will now permit accepting locally applicable specifications, for grading especially, within limitations. However, specifications that apply for subcontractor aggregate plant production have not been relaxed and continue to be very difficult to meet. New specifi-

"Less shake...





Less noise...



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BLAST DATA:

Number of holes	9
Average depth	56′
Spacing	17′
Burden	6 to 20′
ROCKMASTER delays	0 through 8
Average stemming	17′
Diameter of holes	6″
Total powder (Apex #4 HV and #2 MV)	3025 lb.
Rock produced	14,000 Tons
Powder factor	4.63
Loading started	8:30 AM
Loading finished	10:30 AM
Blast fired	11:15 AM

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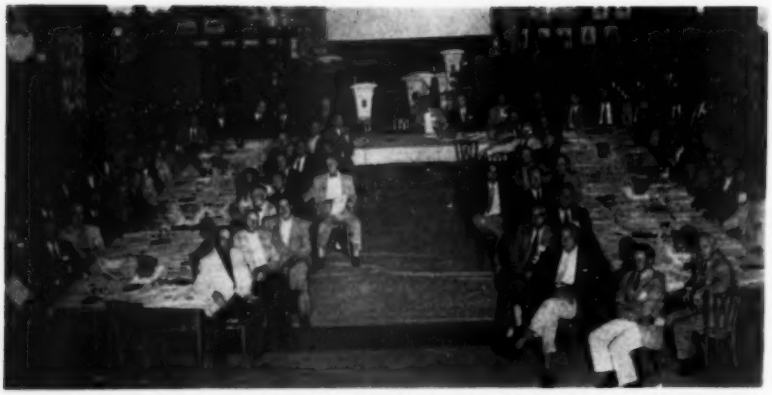

Joint meeting of the two boards, representing National Sand and Gravel Association and National Ready Mixed Concrete Association

cations for crushed aggregate to be used for concrete bridge structures in Ohio were cited as an example of very difficult problems to meet.

Within the last five or six years it has been observed that sand and gravel concrete has suffered somewhat by comparison with crushed stone concrete in compressive strength, where such concretes were of comparable strength before. Mr. Walker believes that the advent of air-entraining agents is responsible since strength is a function of the mortar and there is less mortar in sand and gravel concrete than with concrete of crushed aggregate.

He reported good progress in the use of sand and gravel in bituminous mixtures and opportunity for greater gains. Use of sand and gravel for railroad ballast has declined which he attributes to the industry's not pushing for that business. He suggested that the idea of using rounded gravel with crushed sand for the purpose might be promoted.

R. P. McKenrick, Blaw-Knox Equipment Div., Chairman of the Manufacturers Division, reported on the recent meeting of that group in Chicago. The Division reaffirmed its wishes that exhibits be held only in the even years and that there be no organized entertainment by manufacturers at the annual industry conventions. At the coming convention in Miami, Fla., January 9-13, 1955, manufacturers are to be housed in one or two hotels for the convenience of producers. The possibility of holding the 1958 exposition of machinery at the new Coliseum being built in New York City was suggested.

The directors voted favorably for preparation of a Driver's Manual similar to that prepared for the National Ready Mixed Concrete Association. Also, it was agreed that a meeting be held, likely in Chicago, for auditors and accountants of member companies as a means to help them in making out income tax returns correctly.

In the general discussion, one producer told of efforts of a railroad carrier to backbill the company five years for an error involving the under-loading of cars.

Joint Meeting

At the concluding joint session of the two boards of directors, future conventions and other matters of interest to both associations were considered.

Louis Schilling, chairman of the Miami committee on arrangements, told the progress in planning and outlined the entertainment program. The headquarters hotel will be the Columbus (January 9-12, 1955) and the open sessions are to be held in the Miami Auditorium. This is a non-exhibit year. A silver anniversary dinner is to be held in commemoration of the N.R.M.C.A. 25th year.

The 1956 annual conventions of the two associations will be held with exhibits at the Conrad Hilton Hotel, Chicago, February 13-17. The 1957 conventions (no exposition) will be held in Los Angeles, Calif., February 11-14. A tentative reservation has been made to hold the 1958 conventions and exposition at the Conrad Hilton Hotel, Chicago, February 9-13 but an invitation has been received from New York to hold the 1958 conventions at the new Coliseum. The decision will be made at the Miami meeting. New Orleans, La., will have the 1959 conventions, February 15-19. Several locations are under consideration for the semi-annual meetings of the boards of directors in 1955 with the decision soon to be made.

Director of Engineering Stanton Walker summed up the many technical activities, including research, publications and committee work. He touched upon the very favorable working relations the two associations have with the University of Maryland, and he reviewed the scope of the research fellowships and the staff and its many accomplishments.

The short course on concrete and concrete aggregates continues to grow in popularity and will be held the week of November 15 this year. It may be necessary to ask producers to restrict the number of men sent to attend. The separate short course, for bituminous mixtures, will be held December 7-9 at Purdue University.

The group insurance plan is working out very favorably and more than 1100 employes of 40 member companies were covered by the plan as of the time of the meeting, with more to be added. Considerable sums in payments have been made for accidental deaths and life insurance in the short time the program has been in effect.

The meeting concluded with a general discussion of collective bargaining agreements. It was brought out that any forthcoming amendments to the Taft-Hartley Law will be tighter and for more benefits to employes. An important point brought out was that the industry be fully aware of its responsibilities and the need for strictly adhering to collective bargaining with its employes with no deviation. Many members said that they have no way to check on the disposition of funds paid to unions for welfare programs, yet they know they will be held responsible for payments to widows if the unions fail to do so.

Ready-Mix Session

President and chairman of the Board of Directors, National Ready-Mixed Concrete Association, Robert C. Collins, Philadelphia, Penn., presided at the Wednesday afternoon session. His address was brief and to the point, reciting the very real accomplishments of the Association in recent months. The Washington staff, with the active assistance of some members, has been successful in convincing the national authorities that government contracts for ready-mixed concrete need not be made subject to renegotiation, as they have been since the War days. While there were few if any cases in this industry, the new ruling does save the making out of numerous useless reports.

At the chairman's suggestion, resolutions were adopted commending F. P. Spratlen, Jr., past-president, for his very effective work in accomplishing the foregoing ruling. Also, a resolution was adopted, to be spread on the records of this meeting, complimenting Stanton Walker for the services rendered the industry through his activities in the American Society for Testing Materials. The subject was brought before the Board by a letter from the Secretary of the A.S.T.M. to the president of the Association.

No. 2 of a series

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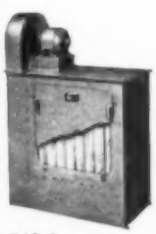

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especially for the purpose of recognizing the services rendered the A.S.T.M. by Mr. Walker, who is retiring as a board of direction member of the A.S.T.M.

Engineering and Laboratory Report

At this meeting Stanton Walker confined his remarks to matters of concern chiefly to the ready-mixed concrete industry. Problems in the laboratory are research on admixtures, lightweight ready-mixed concrete, handling and placing, as well as others more familiar to producers. Mr. Walker emphasized that too little attention is paid to operating plants for a quality product, and possibly too much attention to methods of sale and promotion of the product. He said it must be constantly realized that the prestige of the industry and the product are involved, and that quality control must be constantly and consistently emphasized, remembering always that in the chief markets for ready-mixed concrete, quality is a very important factor in its acceptance in competition with job-mixed concrete. In this connection Mr. Walker said that the new truck-mixer ratings were generally considered nominal and were pretty well established. Tests have proved that a 10 percent overcapacity (old rating) can be just as efficiently mixed as before, but it doesn't mean that a mixer which did not give a good mix before is improved by the overload. Acceptance of the new standards is not universal as yet. The A.S.T.M. standard specification has been revised to comply with the new standard loadings, but it remains for committee C-9 (on concrete) and the Society to accept it.

Mr. Walker brought out the difficulties in meeting some federal government specifications for ready-mixed concrete. The Corps of Engineers, U.S.A.,for example, at present will accept ready-mix for only relatively unimportant work. Where it is permitted they expect the same kind of control as on job mix. Directives in the course of preparation are expected to require concrete using coarse aggregate larger than 2-in. to be mixed in fixed plants, but concrete of smaller sizes of aggregate may be ready-mix, on jobs of limited yardage. For larger jobs various methods of mix control will be required, as would be the case with a fixed plant on the job site. At the present moment the specifications for the federal housing program make the use of ready-mixed concrete practically impossible.

Manufacturers' Division Report

Robert W. Smith, chairman of the Truck Mixer Manufacturers' Bureau, reported the results of executive com-

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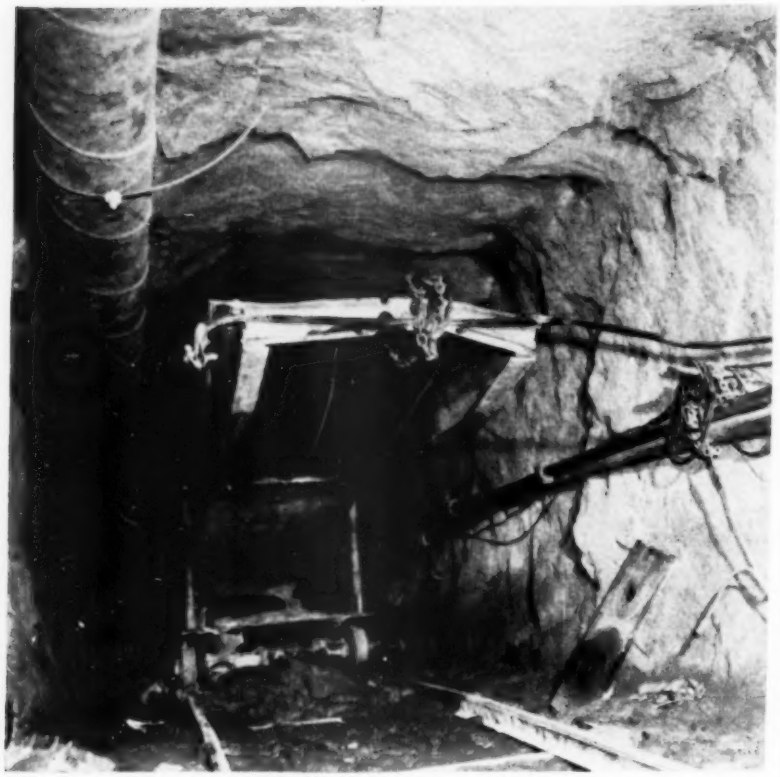
A MAJOR NEED FOR MINERS



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mittee and directors' meetings of the Manufacturers' Division, held since the January conventions in Chicago. He said that many members felt that more space is needed for an adequate exhibit, and he was in hopes that for the 1956 convention, which is scheduled for Chicago again, use could be made of the underground parking facilities (under Michigan Ave.) which are within a few blocks of the Hilton hotel. He said some manufacturers were unhappy about closing the show during the operating problems session, but nevertheless liked to attend the meeting themselves.

The primary activity of the Truck Mixer Manufacturers' Bureau since the conventions, Mr. Smith said, was cooperation with motor truck manufacturers, for the first time in history, to attempt to develop or design motor trucks especially adapted for mixer-truck service. So far at least, there has been a good exchange of information regarding the selection of the features in the design of trucks most to be desired.

The rest of the agenda dealt chiefly with plans for the 25th (Silver Anniversary) program of the Association to be held in Miami, Fla., next January, where Louis C. Schilling, has promised special attractions.

Safety Standards Manual

THE ASSOCIATION OF CASUALTY AND SURETY COMPANIES has announced a revised edition of the 315-page "Handbook of Industrial Safety Standards," compiling industrial safety requirements recommended by the American Standards Association, National Fire Protection Association, American Society of Mechanical Engineers, and various governmental organizations. Data is included on safety programs, materials handling, boilers and unfired pressure vessels, exhaust systems, electrical equipment, prevention of "off-the-job" accidents, etc. Additional chapters are given on welding and cutting, storage and handling of flammable liquids, radiation hazards and disaster control. Included in the appendices are an index to American Safety Standards, a table of maximum allowable concentrations to toxic substances and a classification of fire extinguishing appliances. Copies of the book are available at a cost of $1.40 from the Association at 60 John St., New York 38, N. Y.

Cement Distribution Plant

PERMANENTE CEMENT CO., Oakland, Calif., has opened its East Pasco, Wash., distribution plant. It has a storage capacity of 7000 bbl. of bulk cement, which is supplied by the company's Portland, Ore., distribution plant.

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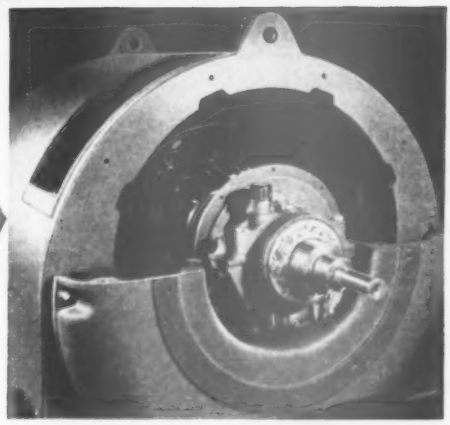
more protection with full accessibility



* New Allis-Chalmers slip-ring motor with inspection cover and upper half of end shield removed. Note accessibility of brushes, protection of bearing.

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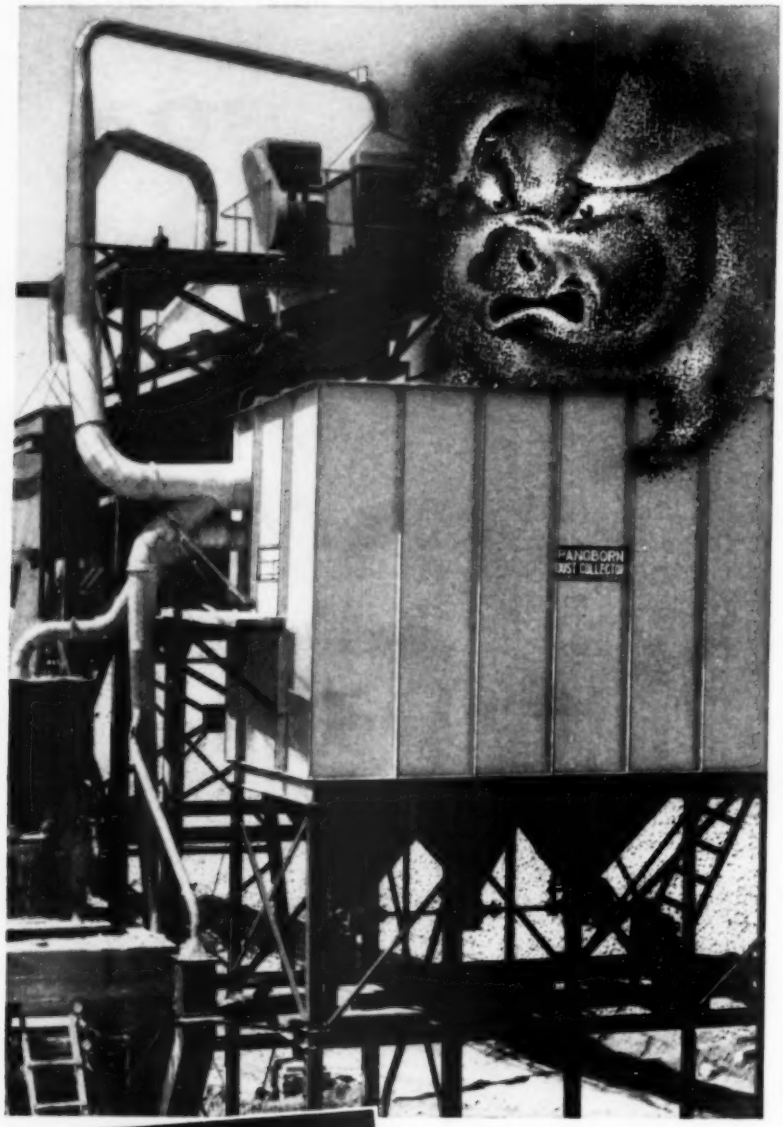

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Foreign Cement Production

DENMARK: The cement industry is an important factor in Denmark's economy and contributes considerably to its export trade. The type of cement produced is largely portland cement, but rapid-hardening, white and colored cements are also produced. Larger export orders contributed to the substantial increase in production in 1952, which reportedly reached a total value of 125,000,000 kroner (one U. S. dollar equals 0.45 Danish kroner), compared with 90,000,000 kroner in 1951. Although there are four Danish cement plants, the industry is dominated by one important firm which produces 80 percent of the total cement.

GERMANY (WESTERN): Production of cement in Western Germany totaled 12,886,000 metric tons in 1952. Imports of cement totaled 1670 tons in 1952, compared with 2847 tons in 1951. The 1952 imports were from: Switzerland, which supplied 1160 tons; France, 378 tons; and 132 tons from other countries. In 1951, France supplied 1071 tons; Switzerland, 956 tons; Great Britain, 108 tons; Austria, 542 tons; and Czechoslovakia, 170 tons.

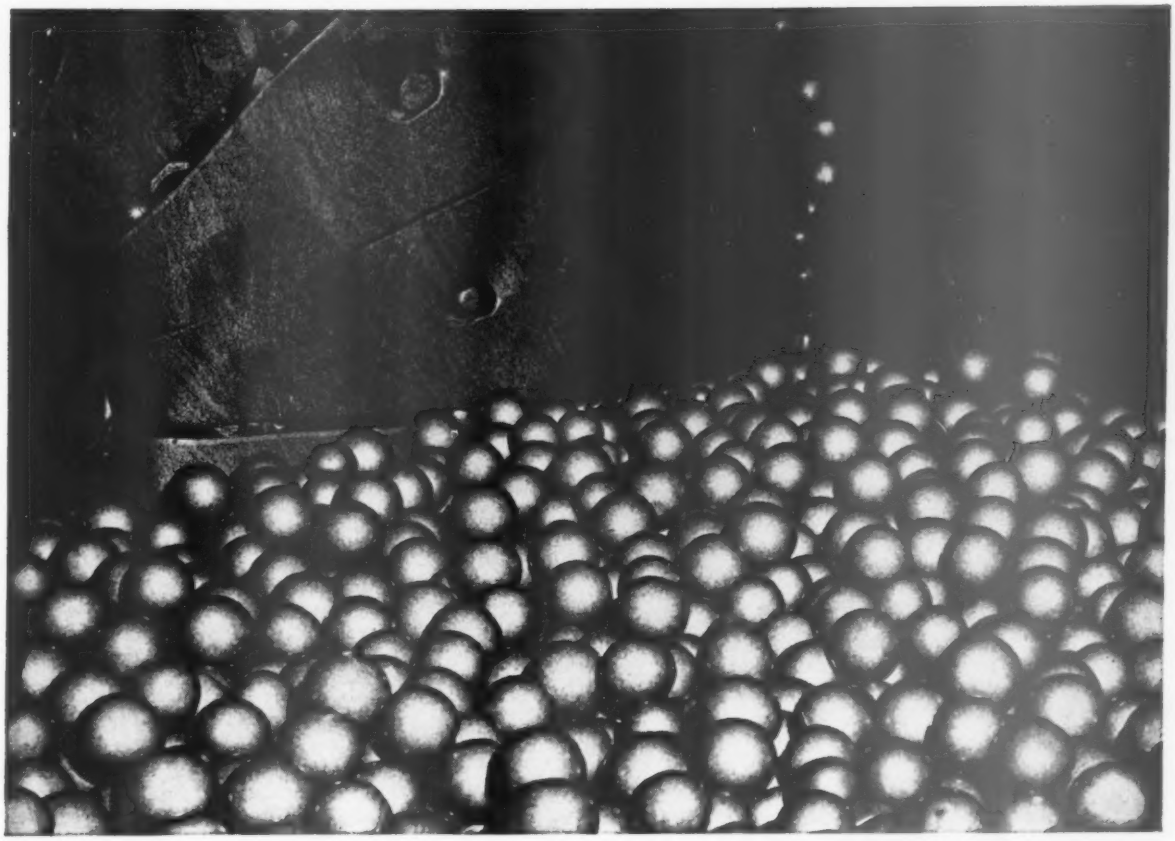
Exports of cement from Western Germany totaled 1,771,763 tons in 1952, compared with 1,581,021 tons in 1951. Largest exports in 1952 were to: Brazil, 454,358 tons; Argentina, 349,546 tons; Netherlands, 320,894 tons; Indonesia, 102,609 tons; Turkey, 97,750 tons; and Canada, 66,316 tons. Largest exports in 1951 were to: Italy 359,648 tons; Brazil, 334,921 tons; Argentina, 245,343 tons; United States, 122,737 tons; Venezuela, 98,744 tons; Turkey, 72,659 tons; and Great Britain, 71,441 tons.

In the first half of 1953, Western Germany imported 3062 tons of cement, supplied by France and Switzerland. Exports during the same period totaled 950,827 tons, with the largest quantities going to: Brazil, 262,361 tons; Netherlands, 230,371 tons; Great Britain, 84,131 tons; Turkey, 54,726 tons; Italy, 49,162 tons; and Indonesia, 41,267 tons.

INDIA: Production of cement in India continued to increase in 1953, reportedly reaching 3,700,000 long tons; output in 1952 was reported at 3,537,600 tons. A new cement plant near Paonta, where gypsum is said to be abundant, reportedly is under consideration.

NORWAY: Production of cement at Norway's three cement plants reportedly has climbed steadily in the past several years. It is expected that the final 1953 figure will be well over 750,000 tons, and that the 900,000-ton

(Continued on page 128)



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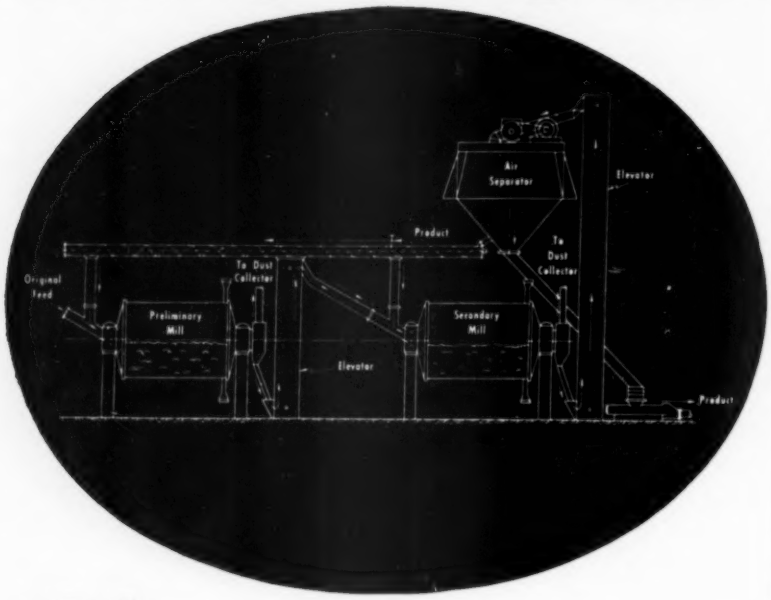
lower grinding costs



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mark will be reached within a few years.

Cement production in 1952 totaled 722,700 tons, compared with 712,800 tons in 1951, and 579,600 tons in 1950. Imports in 1952 amounted to 11,700 tons, compared with 25,400 tons in 1951, and 2700 tons in 1950. Exports totaled 56,100 tons in 1952, and 25,400 tons in 1951, with none reported for 1950. The largest exports in 1952 were to: Madagascar, 1350 tons; Costa Rica, 1063 tons; and Arabia, 1000 tons. In 1951, the largest exports were to: Costa Rica, 1063 tons; and Madagascar, 660 tons.

Increased defense construction has been keeping demand for cement in Norway well ahead of supply and is expected to do so for the next several years. The Nordland plant, in north Norway, reportedly plans to double its output in two years, from the present level of 80,000 tons annually.

The two major producers, both south of Oslo, plan to continue their gradual rate of expansion. One of them, however, has been forced to move its quarrying operation to a new location (requiring the construction of a funicular), but limestone reserves in the vicinity of both Dalen and Christiana are said to appear adequate for a long time. Of the more than 2,000,000 metric tons of limestone produced in 1952, the three cement producers reportedly used 1,100,000 tons. Production of limestone is expected to rise steadily in the future, keeping pace with expansions in the cement industry.

These reports were taken from the December, 1953, and January, 1954, issues of *Mineral Trade Notes*, published by the Bureau of Mines.

Expanded Clay-Shale Meeting

THE EXPANDED CLAY AND SHALE ASSOCIATION held its mid-year meeting August 10-11, 1954, at Detroit, Mich. President Glenn C. Barnes presented reports of the various committees, including a report related to the marketing of good, graded aggregate and another concerning tests being conducted by Underwriters, universities and private laboratories. A long-range program was set up for future work, and by the time of the February meeting, the association plans to have acquired a full-time engineer. A tour through the Light Weight Aggregate Corp. plant at Plymouth, Mich., was conducted on August 11.

Agstone Plant

GREENHORN LIME PRODUCTS INC. has started production of agricultural limestone at a new plant in Seward County, Neb. The quarry has little overburden, and production will be approximately 60 t.p.h.

CLOSE-UP of quarry's 90' face before 6900-lb. shot.

BLAST produced over 20,000 tons of well-broken road stone.

EASTERN QUARRY REPORTS:

Safety and good breakage go hand in hand with Du Pont blasting "team"

Plenty of road stone, and safety in producing it point up blasting operations at the Latrobe Construction Co.'s Long Bridge, Pa., quarry. All shooting here is handled with a Du Pont "team" of "Nitramex"® #2 and MS-9 Connectors. According to Bruno Ferrari, president, this blasting combination gives Latrobe the effective breakage required, while providing the ultimate in safety.

Here's why: "Nitramex" #2 offers all the shooting power you need *plus* safety features. Shock, friction and fire cannot detonate it—*only* a "Nitramon"® Primer, also relatively insensitive, will. And because "Nitramex" #2 is non-headache-producing and comes in watertight containers, it makes for efficient handling. Delaying individual holes with MS-9 Connectors greatly improves fragmentation and also minimizes vibration . . . a mighty important factor near built-up areas.

Scores of quarries using this, or other Du Pont blasting "teams" have reported consistently good fragmentation and safer operations. Have you tried one of these dependable combinations? If not, contact the Du Pont Explosives representative in your area for complete details. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

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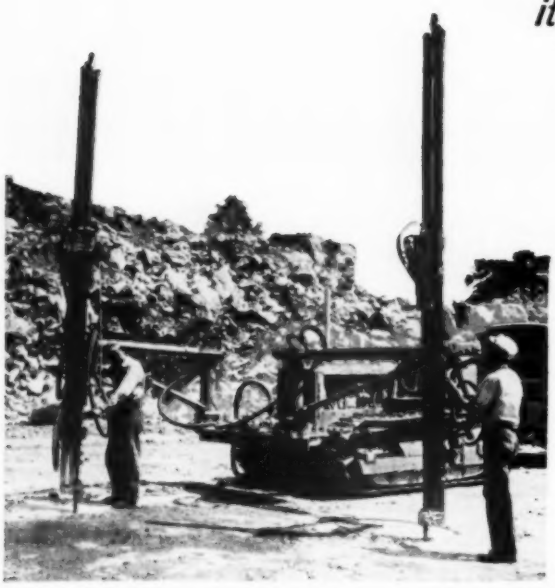
BLASTING AGENTS
Products of Du Pont Explosives Research
DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

A TRIPLE COMBINATION *at its* **rugged best**



Just think of the mobility and drilling efficiency you can get from this quarry rig!

ONE—you've got a maneuverable 600 cfm. Power Vane Rotary Compressor for a completely dependable air supply. Its oil injection system provides copious lubrication during off-level operation, yet oil consumption is low. A variable speed capacity regulator helps prolong engine life and reduce wear and tear.

TWO—you've got a rugged pair of CP Drill Arms. Both booms are readily adjustable to any drilling position ... vertical adjustments are made by a rotary air motor ... lateral positioning is controlled by air-actuated post locks. Automatic safety locks prevent boom arms from settling.

THREE—*and to top it all off,* mounted on the drill arms you've got two CP drill carriages whose tubular construction provide the rigidity and strength to stabilize and feed the two hard hitting, strong rotating CP-70NDC Drifters.

For more details on how you, too, can set up a CP team to go to work in your quarry write, *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

INFORMATION

TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

You can obtain catalogs listed on these pages by merely checking and mailing the coupon below

1 **ASPHALT PLANT**—Standard Steel Corp. has released Bulletin 541, introducing the model TM portable batch type asphalt plant. Features are described, including gradation, weight control and capacity.

2 **AUTOMATIC SCALE CONTROLS**—Richardson Scale Co. has prepared Technical Reference 53J, describing and illustrating indicating and recording systems for use with standard Richardson scales. Descriptions are included of the sequence of operations involved in the weighing, indicating and recording processes.

3 **BOILERS**—Orr & Sembower, Inc. has announced a booklet entitled, "Have You Checked Your Steam Costs Lately?" Powermaster packaged automatic boilers are described, and typical installation photographs are shown.

4 **BULK HANDLING EQUIPMENT**—Dravo Corp., Crane & Bridge Dept., has published a 32-page illustrated booklet entitled, "Dravo Equipment for Handling Bulk Materials." The mechanical, electrical and structural features of various types of bulk handling equipment and structures are discussed.

5 **BURNERS**—Hauck Manufacturing Co. has brought out Catalog 414, describing the Series 480P oil or combination gas and oil burners for rotary sand and gravel dryers and rotary calcining kilns. Photographs and capacity and dimension tables are given.

6 **CENTRIFUGAL THROWER UNITS** — Stephens-Adamson Manufacturing Co. has issued Bulletin 854 covering the line of stationary and portable "Swiveloaders" for loading or storing bulk materials. Operating and installation data is given.

7 **CHAIN DRIVES**—Morse Chain Co. describes and illustrates silent chain, roller chain and Hy-Vo drives; sprockets, cable chains, drive shafts, couplings and clutches in Catalog B20-53. Specifications, stock sizes and applications are included for each product.

8 **CHAINS**—Beaumont Birch Co. has released a catalog sheet, No. 4140-19, describing and illustrating the No. DT-132B "Dura-Tred" "Beaucolloy" steel combination chain for use with "Trac-Pull" wheels and bucket elevators or bulk handling conveyors. Construction features and operation and application data are included.

9 **CHURN DRILL TOOLS**—Spang & Co. has published a bulletin on "Churn Drill Tools for Blast Holes." Specifications, illustrations and descriptions are given for bits, drilling stems, replacement blade sections, dart valve bailers, and drilling and fishing jars. Bit size and weight tables are included.

10 **CONCRETE AND CINDER BLOCK**—Calcium Chloride Institute has announced Brief CB-1, giving data on the use and advantages of calcium chloride in concrete and cinder block production. Illustrations are also given.

11 **CONCRETE PIPE CORROSION**—American Concrete Pipe Association has published a technical paper entitled "Synopsis of Report of Work on Prevention of Concrete Pipe Corrosion," conducted at Tulane University in 1953.

12 **CONSTRUCTION EQUIPMENT** — Blaw-Knox Co., Equipment Div., has published Bulletin 2463 on its equipment for road construction. This includes batching and mixing plants; clamshell buckets; concrete buckets, finishers and spreaders; steel forms; truck mixers; and parts and services.

13 **CONVEYORS**—Bonded Scale and Machine Co. has published Catalog 54, describing and illustrating various type conveyors, bucket elevators and feeders. Portable and stationary models are described and typical application photographs are included.

14 **CORE DRILL**—Sprague and Henwood, Inc. has issued Bulletin 160, describing and illustrating the Model 142 diamond core drilling machine. Specifications, working data, and a list of accessory equipment are given.

15 **CRAWLER-TRACTORS** — Allis-Chalmers Manufacturing Co. has released a 16-page brochure entitled "Facts on a New Breed of Tractors," illustrating diesel-powered crawler tractors. A review of crawler tractor progress during the past century is also given.

16 **DIAPHRAGM PUMPS**—Essick Manufacturing Co. has released literature on the Model 4D diaphragm pumps. Specifications, capacities and features are included.

17 **DUMP BODIES-HOISTS**—The Galion Allsteel Body Co. has published a four-page catalog describing Model 12N-3 bodies and Model 600, 700 and 710 hydraulic hoists. Action photos, line sketches, cutaway views and specifications are given and, construction details and mechanical features are discussed.

18 **ELECTRIC MOTORS** — U. S. Electrical Motors Inc. has published Booklet 1878 illustrating in natural color the 20 principal types of improved U. S. motors. Cutaway views, and details on Lubriflush lubrication are given.

19 **ELECTRIC PROCESS EQUIPMENT**—General Electric Co. has announced a 28-page bulletin, No. GED-1966A entitled "Electric Equipment for the Process Industries." It gives data on electrical equipment for power generation, distribution and conversion; power utilization; instrumentation; and company service shops and warehouses.

20 **ELECTRIC TRUCKS**—The Yale & Towne Manufacturing Co. has brought out a 12-page booklet, describing and illustrating electric trucks in capacities ranging from 1000 to 100,000 lb. Cutaway photographs, diagrams, typical application photographs and specifications are included. A representative group of attachments are also described and illustrated.

21 **ENCLOSED MOTORS**—U. S. Electrical Motors Inc., has brought out a full-color bulletin describing and illustrating the Armored Uniclosed motor. Cross-sectional and cut-away views are given as well as views of steps in the manufacturing of the motors.

22 **EXCAVATING-DRILLING** — Bucyrus-Erie Co. has released a 70-page general catalog, No. GC-5A, describing its line of excavating, drilling and material handling equipment. Specifications and typical application photographs are included.

23 **EXHAUST FANS**—Fort Worth Steel and Machinery Co. has announced an industrial exhaust fan catalog, No. 500-B, featuring the S-2 exhaust fan, and descriptions of various applications, types and construction. Application principles and engineering data for standard and long-cone cyclone separators are also given.

24 **FLEXIBLE HOSE**—Aeroquip Corp. has released bulletin 123, describing and illustrating flexible hose lines with detachable, reusable fittings. Specification tables, typical application photographs and cutaway illustrations are included.

25 **FLOTATION** — Denver Equipment Co. has issued a flowsheet, No. M7-F30, describing "Sub-A" flotation of phosphate. A diagram points out the advantages of the process.

26 **FORK TRUCK**—The Elwell-Parker Electric Co. has brought out literature giving diagrams of turning areas and construction details of the Model E-2 telescoping fork truck.

27 **HARD FACING**—Mir-O-Col Alloy Co., Inc. has announced a comparison chart on hard-facing rods and electrodes. Abrasion and impact qualities, and individual hardness ratings are listed.

28 **HYDRAULIC DRIVES** — The Oilgear Co. has announced Bulletin 56610, describing "Oilgearducers," packaged hydraulic drive output units. Specifications cover complete variable speed drives with and without the units and, typical applications are listed and described. Installation dimensions are also included.

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29 INDUSTRIAL ENGINES—Willys Motors, Inc., Industrial Engine Dept., has issued a brochure, describing Power Giant four-cylinder industrial engines, Model L-4 "Jeep" and Model F-4 "Hurricane." Installation diagrams, and power, torque and fuel curves at various r.p.m. are given.

30 INDUSTRIAL POWER EQUIPMENT — International Harvester Co. has published a 48-page catalog, describing its complete line of industrial power equipment, including crawler tractors, scrapers, bulldozers, and diesel, gasoline and gas power units.

31 INSTRUMENTATION — Minneapolis-Honeywell Regulator Co., Industrial Div., has issued Bulletin 100-C, listing available literature on instrumentation. Included are numbers and titles of catalogs, bulletins, specification sheets, and instrumentation data sheets.

32 LUBRICATING OILS—Internal Combustion Engine Institute, 201 N. Wells St., Chicago 6, Ill., lists the trade names of over 1200 lubricating oils offered by 366 oil companies for meeting certain heavy-duty industrial engine requirements in a 48-page booklet, Form 200. It is available from the Institute at a cost of 20 cents.

33 MULTI-V-BELT DRIVES — The B. F. Goodrich Co., Industrial Products Div., has brought out a 76-page, illustrated multi-V belt handbook, featuring a guide to the design of standard and high capacity drives. Horsepower rating tables, installation tables, belt speeds, and data on pre-engineered drives are given.

34 NON-SHRINK GROUTING—The Master Builders Co. has announced a 16-page booklet, Form E-1c, outlining and illustrating the Embeco non-shrink method of grouting heavy equipment. Data includes recommended mixes and estimating tables. Typical application photographs are shown.

35 OIL FILTER SYSTEMS—Caterpillar Tractor Co. discusses the risks in "short cuts" in lubricating oil filter systems and the importance of using a filter designed for the engine in Form 31085 entitled, "No Short Cuts to Safe Filtering." A description of how a full-flow filtering system serves the engine is also included.

36 OVERSHOT LOADERS — Central Ohio Steel Products Co., Austin Div., has released a folder describing and illustrating Models 4-C and 6-C overshot loaders for mounting on Caterpillar D4 and D6 tractors. Specifications are included.

37 PALLET CLEANER — Springfield Pallet Cleaner & Manufacturing Co. has released a folder describing and illustrating Beals pallet cleaners. A diagram shows operational features, and before-and-after photographs of pallets are given.

38 PELLET-TYPE CALCIUM CHLORIDE—The Dow Chemical Co. has published a 60-page manual entitled "Peladow," reporting on the newly developed, high test, pellet-type calcium chloride. Properties, specifications and applications are included, as well as photos, charts and graphs.

39 PIPE MACHINE ATTACHMENTS—Texaloy Foundry Co., Con-Pipe Div., has prepared a price list for Ni-Hard, a nickel-chromium alloy, attachments for concrete pipe machines and concrete mixers.

40 PORTABLE VENTILATOR—Mine Safety Appliances Co. has brought out Bulletin 1503-1 describing and illustrating the MSA portable ventilator. Specifications, a line drawing, and an air delivery chart are given.

41 POWER TAKE-OFF—Stow Manufacturing Co. has issued Bulletin 542 describing and illustrating its tractor-trailer power take-off drive. Specifications, pump mountings and operation advantages are included.

42 POWER-TRANSMISSION EQUIPMENT —The American Pulley Co. has released a bulletin covering its line of power-transmission equipment. Descriptions and illustrations are included of Wedgbelt drives, Shaft-King speed-reduction drives, adjustable speed sheaves, steel split pulleys, conveyor pulleys, etc.

43 PROCESS PLANT INSTRUMENTATION —Bailey Meter Co. describes instrumentation for modern process plants in Bulletin 17. Specifications and illustrations are included of measuring, transmitting, receiving, interpreting and controlling equipment.

44 PROTECTIVE APPAREL — The Surety Rubber Co. has issued a bulletin on its line of industrial aprons and other protective apparel. Swatches of various types and weights of material used are included along with specifications for each.

45 PRESTRESSING METHOD—Prestressing, Inc. has published the PI Data Manual, describing its concrete prestressing method. The booklet is divided into four sections, structural design, construction methods, equipment and research.

46 ROCK BITS—Manchester Bit Corp. has issued a brochure, describing custom carbide insert rock bits. Specifications are given for the jackhammer, stoping, heavy drifter and wagon drill bit series. Special bits are also described.

47 RUBBER-LINED PUMPS—Allis-Chalmers Manufacturing Co. has announced Bulletin 52B8156 describing and illustrating Type NRL rubber-lined pumps for handling abrasive, fine-mesh materials. A cutaway drawing illustrates its features and, a dimension and range chart is included.

48 RUBBER PRODUCTS — Raybestos-Manhattan, Inc., Manhattan Rubber Div., has announced Catalog 25-C covering V-belts, transmission belts, conveyor belts, hose, molded products and outlining some of its newer products such as Poly-V Drive, etc. Product and installation photos are included.

49 SAFETY DEVICES—The National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill., has published a book entitled, "Safety Devices and Ideas," describing and illustrating over 90 devices which have been tried and found effective in plant use. It is available at a cost of $1.25 to Council members and $2.50 to others, from the above address.

50 SCREENS—Bonded Scale and Machine Co. has released two eight-page bulletins, No. 1087, detailing heavy-duty, four-bearing eccentric shaft screens, and No. 1086, describing and illustrating two-bearing, eccentric weight, general purpose screens. Drawings and tables are also given.

51 SMALL BOILERS — Cleaver-Brooks Co. announced Bulletin AD-135, describing the CB50-80 line of small boilers. Drawings, specifications, major advantages and construction data are given.

52 TRUCK OPERATION—The Elwell-Parker Electric Co. details the do's and don'ts of safe operation of industrial trucks in its recently issued literature. Operator training suggestions and safety regulations are listed.

53 VERMICULITE SPECIFICATIONS—Vermiculite Institute has released the 1954 edition of "Standard Specifications for Vermiculite Plastering and for Vermiculite Acoustical Plaster." Changes have been made to bring the provisions of the specifications in line with the A.S.A. Specification for Gypsum Plastering requirements.

54 VIBRATING EQUIPMENT—The Jeffrey Manufacturing Co. has published a 230-page catalog, No. 870, on Jeffrey-Traylor vibrating equipment, including feeders, conveyors, coolers, mixers, screens, magnetic separators, etc. Operation and application principles of electrical and mechanical vibration are given.

55 WELDING PRODUCTS — Air Reduction Sales Co. has released a 52-page catalog, No. ADC 662B, describing and illustrating Airco products such as; gases, welding and cutting equipment and accessories. Specifications, stock number information, and operational data are included.

Detach and Send Us This Post Card

ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago, Ill. (RP 10-54)

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SECO DRY SCREENS GLACIAL SAND ON MOUNTAIN TOP

PHOTOGRAPHED ON THE JOB AT EMPORIUM, PENNA.

Thompson-Montgomery Enthusiastic About Results

You'll find Seco vibrating screens in some of the most remote parts of the country screening everything under the sun. But this is the first time your Seco On-The-Job Reporter has ever seen a glacial sand deposit on top of a mountain. This is a fact and it exists just outside of the busy town of Emporium, Penna.

The 4 x 10 double deck Seco vibrating screen pictured above is the only equipment used in preparing this sand for market. Shown here, it is producing about 15 TPH of mason sand and about 15 TPH of concrete sand and could easily double this production, if desired. Like so many other operators, Thompson-Montgomery are more than pleased with the trouble-free, efficient performance of this Seco Vibrating Screen. Isn't this what you want on your job? Write, wire or phone.

SECO

TRUE CIRCULAR ACTION

VIBRATING SCREENS

Seco Builds Over 350 Models To Fit Every Screening Need

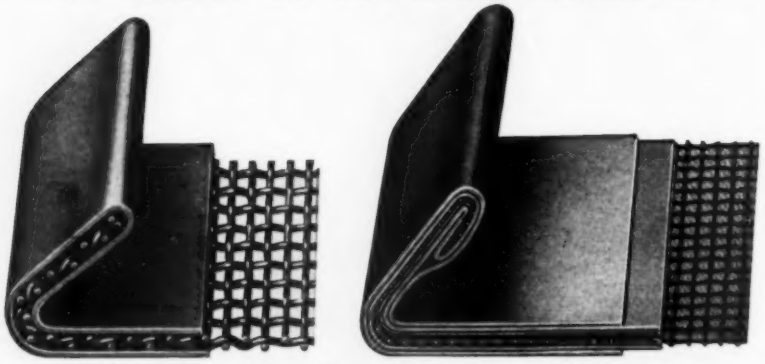
Only Seco has fully controlled true circular action.

Send for catalog No. 203.

SCREEN EQUIPMENT CO., INC.

BUFFALO 25, NEW YORK

Tyler Screen Sections for All Makes of Screening Machines!



Screen sections of Tyler Woven Wire are fabricated for all makes of vibrating screens in any mesh or metal. They are made up with hook-strip or bent-edge construction to suit the machine on which they are to be used.

Tyler hook-strips make possible stretching and maintaining the screening at drum-head tension, which is essential for successful screening and long screen life.

THE W. S. TYLER COMPANY
CLEVELAND 14, OHIO
Manufacturers of Woven Wire Screens and Screening Machinery

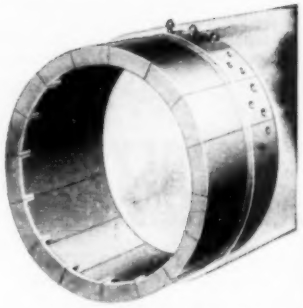
PYRASTEEL

Long-Lived KILN ENDS for CEMENT PLANTS

Several PYRASTEEL Kiln End installations have given 14 years of service in Texas cement plants. Other similar installations have lasted over 12 years. Repeat orders from the above projects were filled four or five years ago, and are still operating.

Such records are typical of PYRASTEEL units . . . that's why many cement producers equip both the feed and discharge ends of their kilns with PYRASTEEL Segmental Kiln Ends.

Over three-quarters of the annual cement output is produced in plants using either or both of our alloys, PYRASTEEL and EVANSTEEL.



PYRASTEEL KILN END, Discharge end

Unit Segments are easy to install or replace

Write for PYRASTEEL Bulletin

CHICAGO STEEL FOUNDRY CO.
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Makers of Alloy Steel for Over 40 Years

Compressed Air Survey

(Continued from page 80)

operators often treat compressed air as if it costs nothing and mis-use it. Usually the air coming from the compressor plant is not metered; neither is air consumption measured in the lines. It is extremely difficult in such instances to say whether a survey and consequential improvements carried out have produced the desired economy, but sometimes compressors maintain the rated pressure during critical peak periods after reconstruction of the plant, whereas, before, the air pressure went down.

By inserting orifice plates in various points of the pipeline, and by periodically fitting a portable flow meter to these orifices, a survey can be based on accurate figures of air consumption and not on guesswork alone. Portable recording air-flow meters are also available, which record the air flow on an instrument chart. For larger air systems, fitting of standard "rate of flow" meters will be a paying proposition, as these will facilitate continuous supervision, also, record charts from compressed air meters disclose not only the actual rate of flow at any time, but show distinctly irregularities of any kind, thus enabling an investigation to be made.

How to Apply Remedies

Once a survey has disclosed the major cause of waste, counter measures are comparatively simple. Where open-ended pipes are used, over-large air outlets on the point of use can be reduced. In order to avoid air valves being left open unnecessarily by the operator, some form of alarm signal can sometimes be introduced; for example, based on excessive pressure drop, and by the installation of a pressure gauge with a minimum contact alarm for excessive pressure loss.

The causes for leaky pipes can be manifold, such as bad packing materials, vibration, water-hammer, slagging pipe hangers or bad roller sup-

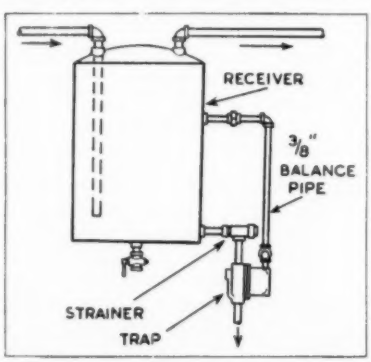
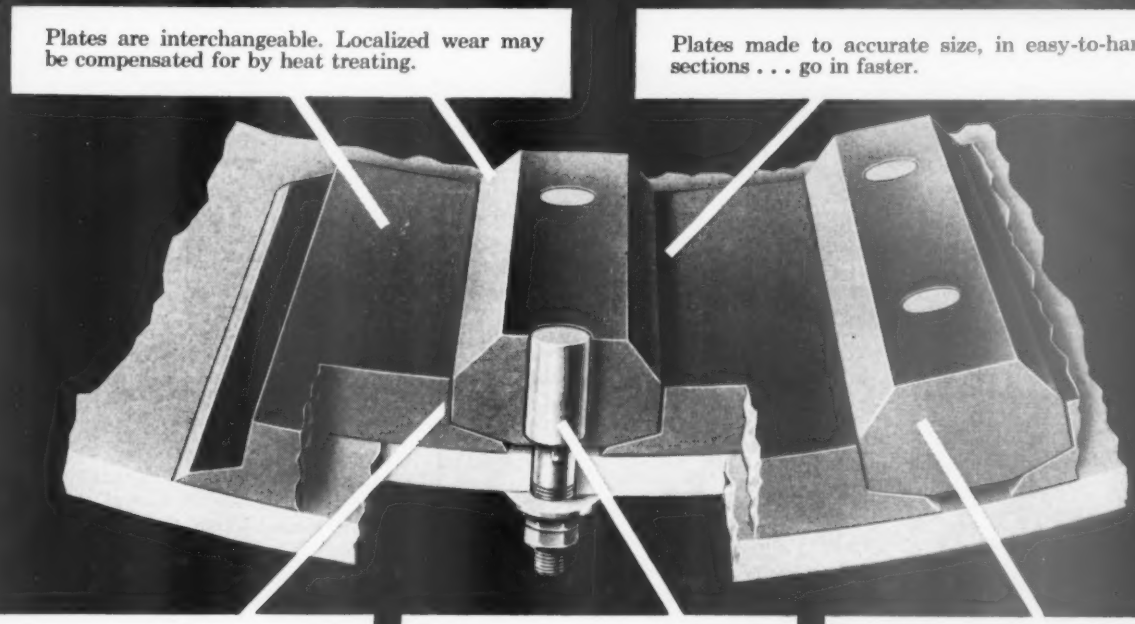


Fig. 3: Recommended method of draining receiver


Plates are interchangeable. Localized wear may be compensated for by heat treating.
Plates made to accurate size, in easy-to-handle sections . . . go in faster.
Accurate fit of lift bars and tight joints eliminates shell wash and allied troubles.
Support for bolt head located near bottom of bar . . . bolts effective for life of lining.
Lift bars designed for correct cascade action. Height of lift varied to suit conditions.

A money-saver in any type mill . . .

USS LORAIN ROLLED PLATE LININGS

● No matter what type of grinding mill you operate, it will pay you to take a look at these cost-cutting advantages of USS Lorain Rolled Plate Linings:

You save on installation time and labor. Lorain Liner Plates can be installed quickly, easily . . . they are made to accurate size and in easily-handled sections.

You save valuable grinding space. The great strength and abrasion-resisting qualities of the rolled steel from which Lorain Plate Linings are made, safely permit the use of reduced thickness. This means an increased usable diameter, increased output for your mill.

You save "down-time" for repairs. Costly mill repairs are reduced with Lorain Plate Linings because the tight fit between ends of plates and between plates and lift bars eliminates shell wash and associated troubles.

You save on replacement materials. USS Lorain Rolled Plate Linings last longer. And severe localized wear at feed or discharge ends can be compensated for simply by reversing the worn plates at opposite ends. You get full-life use from your Lorain Plate Linings.

There are USS Lorain Rolled Plate Linings to fit any type of mill—for wet or dry grinding. They are available through leading mill manufacturers whose names will be furnished upon request.

USS Grinding Balls offer dependable, economical grinding action

Production of USS Grinding Balls is carefully controlled to assure uniformity, surface hardness and maximum hardness penetration. They are available in diameters from $\frac{3}{4}$" to 5". Mail the coupon below for our free booklet on USS Grinding Balls.

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Without obligation on my part, please send me your FREE booklet on USS Grinding Balls.

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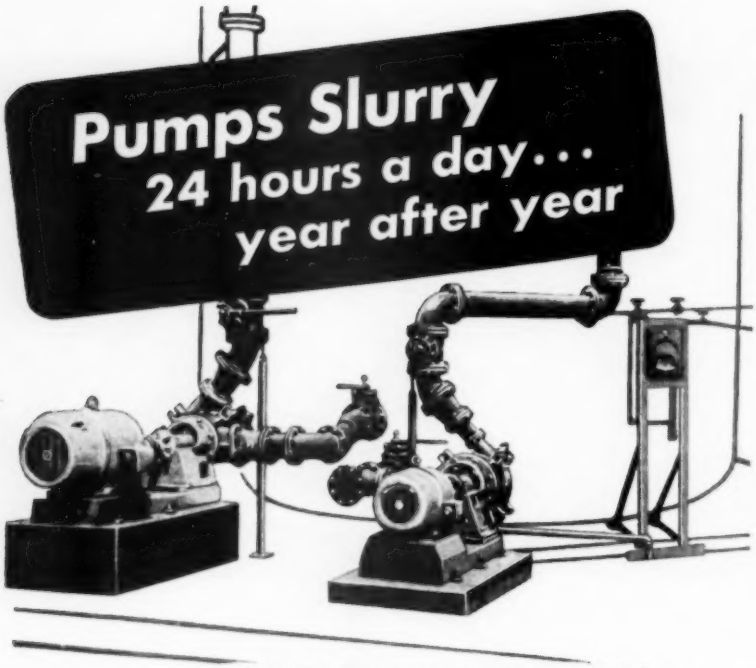
UNITED STATES STEEL



● MORRIS TYPE R SLURRY PUMP at the left is on continuous 24-hr. duty delivering 1000 GPM of a 170° lime slurry at 100′ head. Fifty-HP motor operates at 1180 RPM. Intermittent-duty pump at right delivers 200 GPM at 50′ head with 7½-HP motor turning at 880 RPM.

In slurry-handling operations, "long-term service" is a meaningless claim unless the pump will work day-in and day-out with a minimum of maintenance time, trouble and expense

Morris Type R Slurry Pumps—with an established reputation for longer life—also incorporate in their design exclusive features which result in easier installation . . . fewer interruptions to service...less overhaul...fewer replacements.

To provide uninterrupted service . . .

The gland is under suction pressure only. This reduces leakage and dilution . . . keeps harsh abrasives out of the stuffing box . . . practically eliminates packing troubles.

There are no internal studs or bolts. Caustic and corrosive solutions cannot seep past threads and cause maintenance headaches.

To make installation and dismantling easy . . .

Shell is interchangeable for right or left hand rotation. Suction and discharge nozzles can be rotated around the axis of the pump to a total of 72 different locations.

Impeller removed without disturbing the piping. You simply loosen 4 *outside* clamping bolts and pull off the end cover. This feature alone saves considerable time and labor.

● *Free Service.* Morris Engineers will be glad to recommend the pump best suited to your needs for size, capacity, etc. Send necessary data today . . . include request for Bulletin 181.

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MORRIS *Centrifugal Pumps*

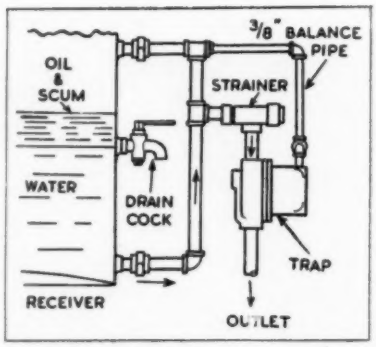


Fig. 5: Drainage of receiver where oil and scum accumulate

ports, etc. By fitting a very accurate and responsive pressure indicator to the main header the rate of pressure drop during standstill periods of the plant can give a useful indication about air leakage, and can be entered in a log sheet by using a stop watch.

Insertion of anti-vibration pieces, made from seamless metallic flexible bellows tubing, often prevents the development of air leaks, as do adjustable pipe hangers, or roller supports, which prevent misalignments of the piping system.

Preventive Maintenance

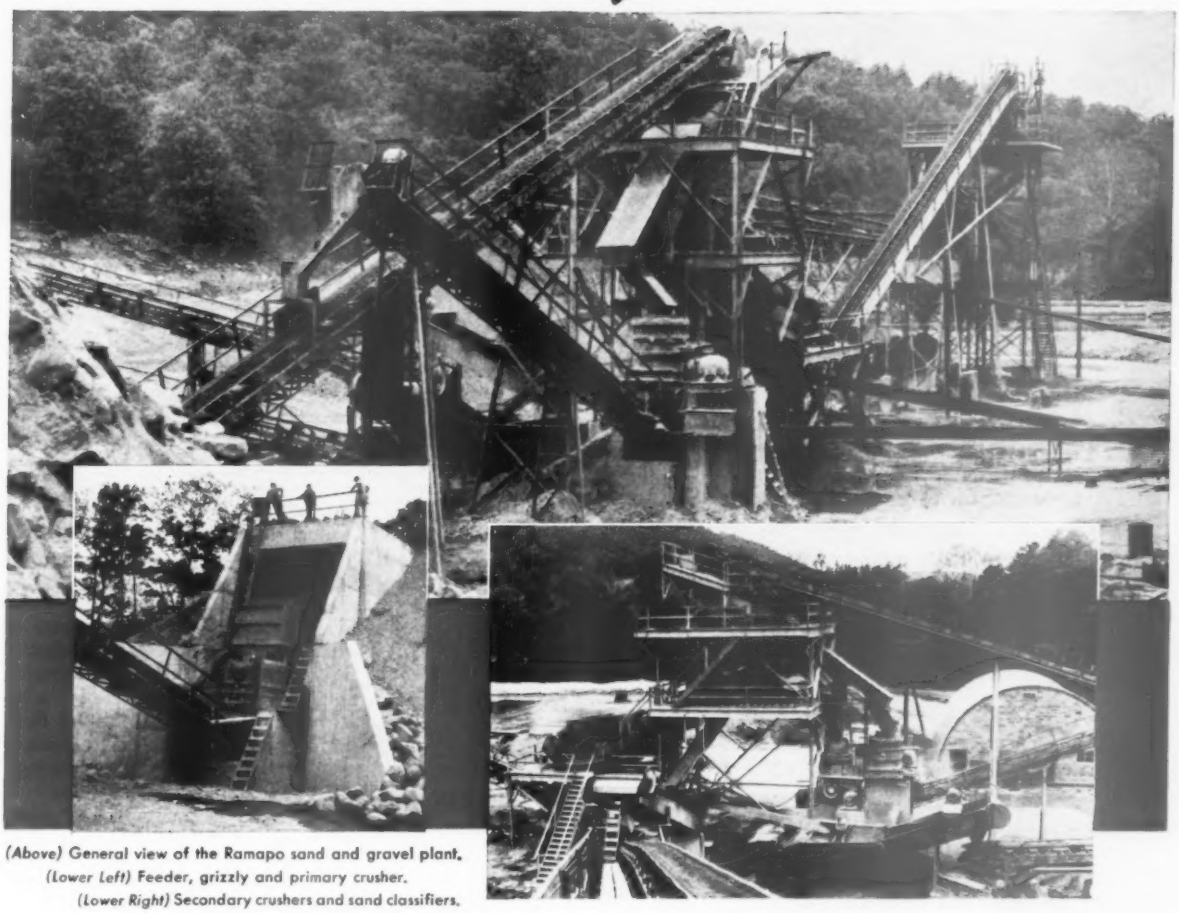
To adopt routine inspection of air compressors is obviously the only means to ascertain continuous and efficient operation. Contrary to an often-heard opinion to "leave well alone," as long as nothing happens, preventive maintenance is the only safe method for avoiding breakdowns. The cost of complete shut-downs of a plant in case of failure of the compressed air system are higher than the average cost of periodical inspection and overhaul, long before any serious trouble could occur.

Oil starvation of cylinders, worn out piston rings or liners, bad bearings, damaged oil filters, choked air inlet filters, encrustations causing corrosion, jamming of moving parts due to misalignment, and a hundred-and-one causes of trouble can safely be detected in good time, if the mining engineer adopts a plan of supervision. In spite of constant maintenance, of course, sudden breakdowns do happen. For example, if a sudden increase in interstage gauge readings indicates compressor valve trouble, it can be assumed that either a broken valve plate or an obstruction for valve closing (solid particles on the valve seat) is preventing a valve from closing. If gauge reading at a lower stage occurs, a leak past the piston can be suspected. Cracking off of spring ends might finish the lifetime of a valve and cause a breakdown. Generally speaking, compressor designs with slow speed

for heavy construction programs

COMPLETE TELSMITH PLANT

meets all requirements



(Above) General view of the Ramapo sand and gravel plant. *(Lower Left)* Feeder, grizzly and primary crusher. *(Lower Right)* Secondary crushers and sand classifiers.

Near the New York Thruway, and close to many other heavy construction jobs, this complete Telsmith plant meets all their aggregate requirements. Built by Ramapo Sand & Gravel Co., Ramapo, N. Y. and designed by Telsmith engineers, it has Telsmith equipment throughout. It makes three sizes of gravel, and concrete and mason sand, all washed. Be sure that yours is a profitable Telsmith plant. Send for Bulletin 266.

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36″ x 6′ Heavy-Duty Plate Feeder • No. 540 Rotary Grizzly • 18″ x 30″ Jaw Crusher • 36-S and 367-S Gyrasphere Crushers • 5′ x 14′ Double Deck Scalper Dry Screen • 5′ x 14′ Double Deck Vibro-King Wet Screen • 60″ x 18′ Rotary Washing Screen • Two 4′ x 12′ Triple Deck Vibro-King Finishing Screens • 24″ x 20′ Twin Screw Sand Classifier • 30″ x 25′ Twin Screw Sand Classifier • Eight Telsmith-BG Belt Conveyors: 30″, 24″, 18″ wide, total length 892′.

G-24

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ANOTHER
AMERICAN HAMMERMILL
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50,000 TONS OF -5" ROCK TO AGLIME

... WITHOUT A SINGLE REPAIR

FIELD REPORT
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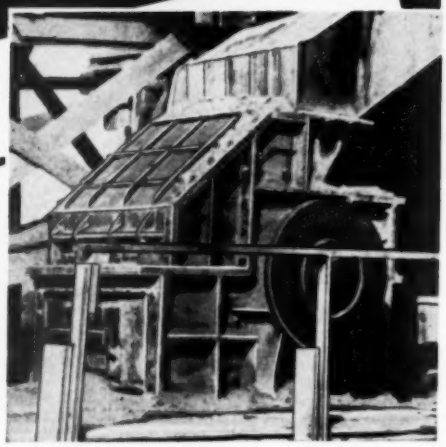
Illinois Quarry



TYPE OF CRUSHER:
American ACS No. 4 Up Running Hammermill.

OPERATION:
Reducing minus 5" rock to agricultural limestone.

PRESENT CAPACITY: 60-120 tons per hour, depending on moisture content of stone.

PROBLEM: Very wet rock, showing 8% moisture—sticky at all times.

COMMENTS FROM USER: "Hammer wear is remarkable: 9400-9700 tons of lime ground to 100% passing No. 8 mesh, per set of hammers . . . Remarkably efficient mill . . . meets our requirements in every way."

Write: for Bulletin No. 147—"Better Stone Crushing"

American PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers
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and long stroke are easier to maintain than the vertical machine with the short stroke and high rate of revolution.

Correct Water Cooling

Efficient compressor operation depends very much on correct use of cooling water, Fig. 1. For average conditions, a cooling water outlet temperature from compressor jackets of about 90 deg. F. is considered good, and avoids excessive precongestion of temporary water hardness. Where water is scarce, controlled re-circulation should be applied, which will save cooling water and keep the machine cool enough to avoid valve or spring trouble due to carbonization. An average figure for water consumption may be about 90-100 gal. at 60 deg. F. inlet temperature for every 100 cu. ft. of free air delivered at 100 p.s.i. Every degree of water inlet temperature counts heavily; if, for example, the inlet temperature is 80 deg. F. the water volume must be trebled, Fig. 2, in order to achieve adequate cooling. Modern air coolers (evaporative coolers) are more widely used now, and allow maintenance of the correct water inlet temperature in spite of compressor load changes. It is most important, however, to check the actual flow of cooling water, and the usual method of fitting a pressure gauge to the cooling water pipe for this purpose can be very misleading, because water pressure can be indicated in spite of a reduced rate of flow due to a choked pipe, etc. The only means of knowing whether sufficient water flows is a reliable indicator based on rate of flow. Similar indicators can be used to check the flow of lubricating oil to bearings, etc.

When automatic stopping or starting of the compressor is applied, a solenoid valve in the water supply can be used to close down flow of cooling water in case of compressor stoppage, and a suitable pressure switch can be used, operated from air pressure produced for actuation of the shut-down valve. Thermostat switches are also recommended to warn the operator in good time when cooling water outlet temperature becomes excessive.

Instrumentation

In compressed air systems, the most widely used instrument is the dial pressure gauge. The first point to be considered is the choice of an indicator having a large dial with bold figures and pointer, which produces good visibility. The latter also makes it desirable to install at eye level, or otherwise to place the dial at an angle at which the operator can see the

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Big savings like this are not unusual when HAYNES hard-facing products are used to prolong the life of equipment. These wear-resistant materials give outstanding service when used to protect conveyor screws, buckets, crushers, tractors, and other equipment exposed to abrasion, corrosion, impact, or heat.

Your local dealer carries a complete line of HAYNES hard-facing alloys, including HAYNES iron and nickel-base rods, HAYNES STELLITE cobalt base rods, and HAYSTELLITE tungsten carbide tube rod. Ask him for descriptive literature. If you don't know the location of your local dealer, write to Haynes Stellite Company, a Division of Union Carbide and Carbon Corporation, Kokomo, Indiana.

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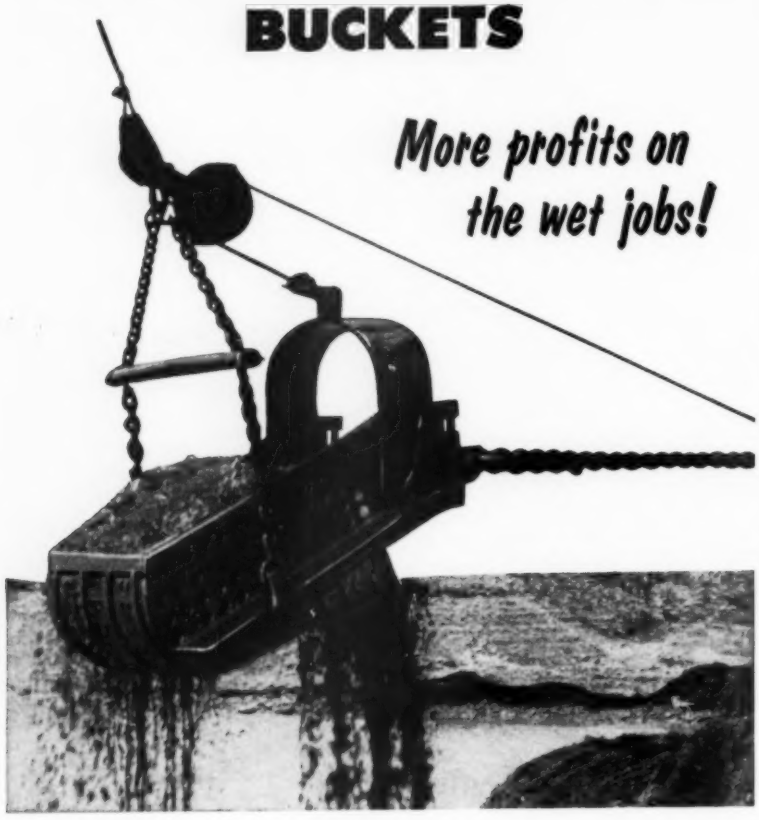
PERFORATED DRAGLINE BUCKETS



THE Wellman-Williams Perforated Dragline Buckets have welded stiffeners the full length of the bucket for maximum strength and rigidity. Alloy steel construction gives maximum strength with minimum dead weight. Teeth are made of manganese steel and are reversible.

Hitch connections can be easily adjusted to any desired digging depth. Gives the operator a wide digging range for faster work.

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position at a glance. For example, if installed near the ceiling, the gauge body should be set forward at a slight angle so that the dial is at a right angle to the line of vision.

The pressure tapping should be at the top of the main or vessel, thus avoiding accumulation of sludge or scale at the tapping point. Stainless steel small-bore tubes are preferred for higher pressure, otherwise ¼-in. or ⅜-in. copper tubing can be used. A stop valve at the point of tapping enables the impulse pipe to be dismantled for cleaning. Usually, an isolating cock is fitted at the gauge itself, for zero test. In order for a test gauge to fit easily, a Tee should be connected to the gauge with a removable plug. The great enemies of accuracy in pressure measurement by means of dial gauges are: (1) dirt in pipelines; (2) water or oil in the piping system; (3) heaving and frequent pressure fluctuations; and (4) vibration. Heavy pressure fluctuations put great strain on the internal mechanism of a gauge, and some damping means should be inserted between gauge and pressure pipe in order to smooth out excess changes. A simple needle valve, a restriction screw, or a length of small-bore coiled tubing can sometimes produce the desired damping effect.

Care of Piping System

It has already been mentioned that it is important to obtain dry clean air at the points of use. In older existing piping systems it is not always easy to ensure moisture and oil-free clean air, where reciprocating compressors are in use. Cylinder lubrication by means of oil is necessary, but this oil can contaminate pipes and ultimately cause trouble.

It also has been pointed out that one of the most important factors of modern piping of compressed air is the application of draining for elimination of water, or of an oil and water mixture from the piping system. Drain cocks are still widely used in existing piping systems, but their efficiency depends on the attention of plant operators, and it is known how unreliable the "human element" can sometimes be. Although it is advisable that air receivers on air compressors should have adequate means of draining accumulated water, proper drainage action is often lacking. It is, however, most important in operation to ensure that, at all times, irrespective of the operator's goodwill the air is kept free of liquids in a piping system. To make draining of water automatic is, however, a simple procedure. By draining automatically the compressor coolers or receivers, water and oil can be conveniently eliminated before it

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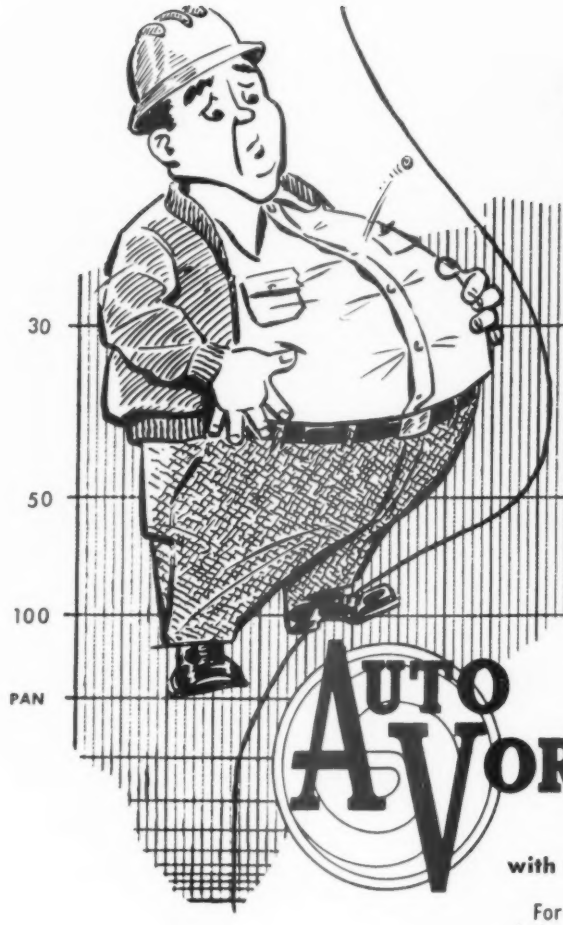
enters the piping system. Fig. 3 illustrates diagrammatically the drainage of a larger receiver by means of a float-operated automatic air trap. A point to be watched is that, when draining compressed air mains, the air traps should always be as close to the drain point as possible. It is also important that the water should be able to flow freely to the drainage point, and traps should always be below the lowest point of a pipeline, Fig. 4.

If an air trap is fitted at the end of a long connecting pipe, or to the receiving vessel, when the trap has discharged the pipe or vessel will be filled with air. Unlike steam, this air cannot condense and form liquid, so that the valve on the trap would remain closed. As shown in the illustration, a good way of overcoming this locking of air is to connect a small-bore balance pipe from the trap body to the air space above the water level in the main or receiver. The water can then displace the air in the trap body and flow into the latter to be discharged. This installation, with a balance pipe between receiver and trap body, prevents air locking; i.e., the accumulation of air which would block drainage. Fig. 5 illustrates automatic drainage of a receiver where oil and scum accumulate on the water surface. The trap is again fitted with a balance pipe and the drain pipe is taken off at approximate liquid level, as shown. A separate drain cock allows oil to run off direct from the receiver. Air traps should be preceded by a suitable pipeline strainer, as shown in the two previous installation diagrams.

Air Separators

In order to separate liquids from air in pipelines, a multitude of air separator designs are in use. It is difficult to advise generally which separator types should be used, because the choice of a separator depends entirely on individual working conditions and requirements. The basic working principle is usually one of the following methods:

Separation of liquids from compressed air can be achieved by the use of baffles and simultaneous reduction of velocity of flow. The body can be made of cast steel or, for larger sizes, can be welded, and the baffle systems can be taken out by loosening the cover for cleaning purposes. Large baffle surfaces can be used, placed at diverging angles, which divide the air stream into small volumes, and provide by means of repeat change of direction of the air filaments for the ultimate elimination of droplets on the baffle surface. The usual separator designs contain separation chambers, whereby droplets can accumulate and



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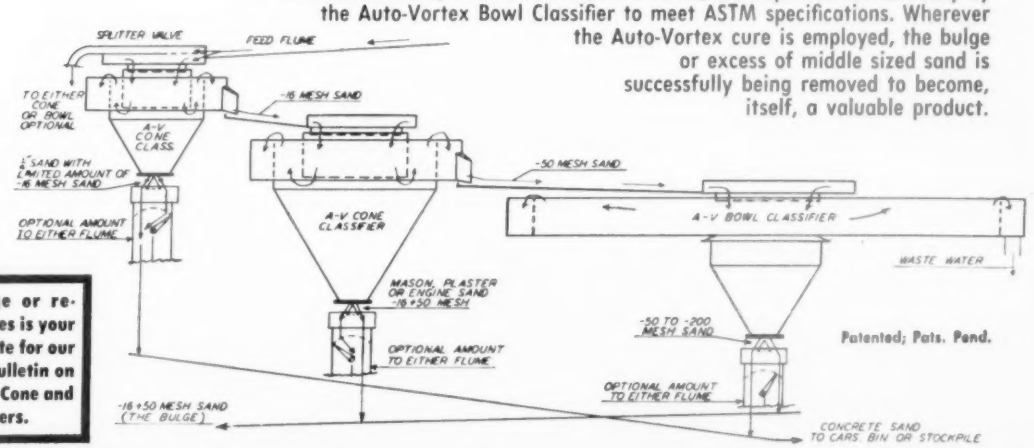
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FEED FLUME
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then flow vertically downwards into a sump, where they are drained by a suitable air trap. Other separator types make the air stream pass through various perforated baffle plates, alternating with repulsing solid baffles, until clean air leaves the separator.

Practical experience has proved that by inserting a good conventional type of air separator, the air can be thoroughly cleaned. Two working conditions, however, have to be adhered to. The oil-water mixture must be automatically drained as soon as it forms, otherwise the air might again pick up impurities; secondly, the apparatus must be regularly cleaned, and frequently inspected for cleanliness. The first condition demands the fitting of the correct type of ball-flat air trap, acting continuously on draining the apparatus. The second condition of cleanliness requires regular cleaning of the filter surface.

The use of a good quality cylinder lubricating oil for a reciprocating air compressor is important. Excessive compressor cylinder lubrication must, of course, be avoided because it would unnecessarily increase the duty of the separator. The advice of reputable suppliers of lubricating oil should be sought, in order to ensure the use of the best possible quality of oil to facilitate separation. In practice, it has sometimes become necessary to experiment to find the right quality oil which does not decompose and remains in droplet form for easy elimination. Where the latter is not the case, only chemical washing of the air will extract oil; this method, however, requires careful drying of the air after wet treatment, and is costly.

A third method of separating liquid droplets from compressed air is the use of centrifugal force. For example, the air enters the separating chamber, which is formed by a worm, and the housing makes the air take a circular spiral path. The heavier liquid particles are subjected to a vigorous whirling movement, until they slide along the walls of the housing downwards into the sump to be drained.

Recommendations

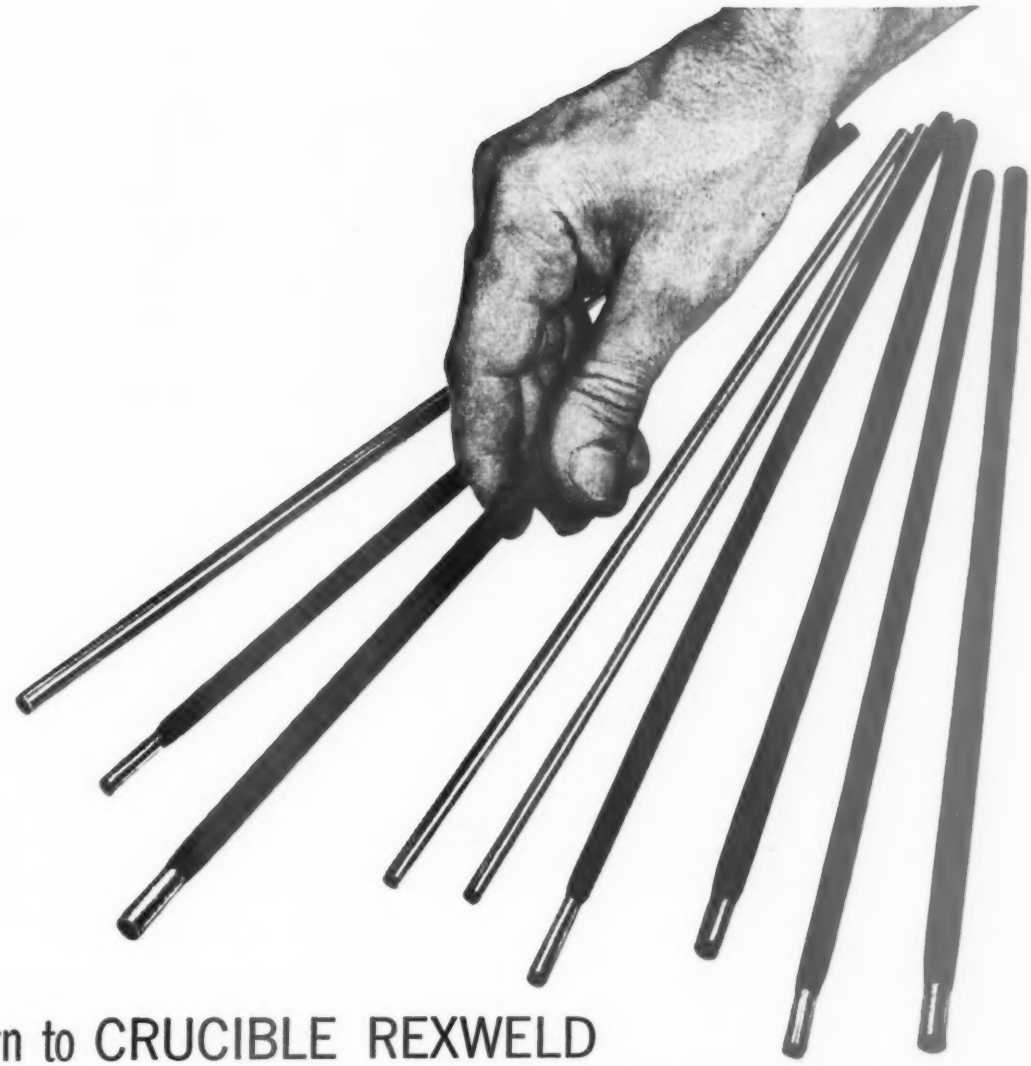
Summarizing the points to be observed when piping compressed air in the plant, the following can be recommended in the light of the foregoing observations:

(a) Check pressure losses in each section of the piping system, and put pipe sizes right where pressure drop seems excessive.

(b) Fit correct type and size of water trap at points of lowest air temperature.

(c) Install automatic drainage at

(Continued on page 146)



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Crucible Rexweld low hydrogen coated electrodes provide greater ease of application. Welding can be done efficiently in both vertical and horizontal positions. And you get denser welds — less porosity, when you use Rexweld.

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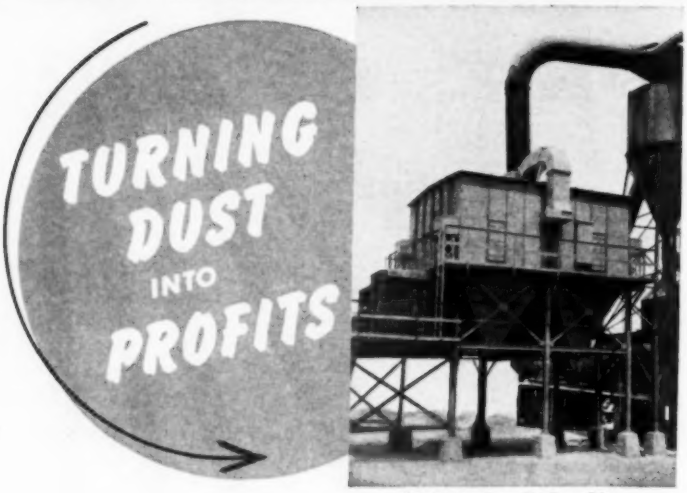

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In an average day's run of 700 tons, the Sly Dust Filter, shown above, collects 10 tons of dust—used as a mineral filler in certain sheet asphalt specifications.

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These earnings are typical. Hundreds of Sly Dust Filters are creating profits in the production of crushed stone, cement, gypsum, limestone, feldspar, flourspar, bauxite, etc.

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ROCK PRODUCTS FEATURES TIMELY INDUSTRY NEWS EACH ISSUE

lowest level points in the pipelines.

(d) Fit a good type of moisture separator in the mains.

(e) Use air filters in branch lines and near points of use.

(f) Provide test points for air cleanliness and check periodically.

(g) It is well to remember that only water or lubricating oil in droplet form can be mechanically extracted, but not vapors.

(h) Measure air comsumption and check power used for production.

(i) Avoid leaks in the piping system and use preventative maintenance.

Chemistry of Glass

(Continued from page 49)

composition of 73 to 74 percent SiO_2, 7 to 13 percent CaO, with 20 percent or less Na_2O.

Like silica, glass adsorbs water and other vapors. In other words owing to the preponderance of silica, the surface of glass is probably negatively charged. Also, by melting glass under gas pressure, some of the gases may be adsorbed in the interior pores and channels. This is interesting because it suggests that lightweight aggregates similar to obsidian might be manufactured. Of course, lightweight slag aggregates are of this character. Also glass is permeable to certain gases, especially at high temperatures and high pressures. For example, hydrogen and helium diffuse readily through silica glass — at about 300 deg. C., which means there are gaps in the lattice structure.

Chemical Durability — Strength

It would appear that something about the durability of cement might be learned from investigations of the durability of glass. Water dissolves glass to some extent, as is well known to chemical analysts who use glass receptacles. Since glass is almost three-fourths silica, alkalies which attack silica will attack glass. Similarly, glasses low in silica are more rapidly attacked by acids. Methods of testing the chemical durability of glass may throw some light on test methods for the durability of cement and concrete. For example, autoclave tests are used for glass as well as for cement, although of course the tests are hardly comparable as such.

Investigations of the strength of glass remind one of those on the strength of cement, mortar and concrete. If hardened cement does bear any relation to glass — and both apparently depend on a silica lattice for strength — the author's statement: "There is no accepted relation between elasticity of a substance and its ultimate strength. A high value for Young's modulus does not necessarily

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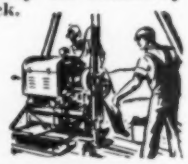

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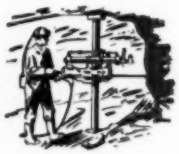

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imply a large tensile strength, nor does a high modulus of compressibility imply a large crushing strength. Also, glass may be broken in any one of many different ways, by tension, compression, twisting, or impact; but there is no connection between the numerical values of breaking strengths as determined by these several methods. Indeed it is probable that in all the various methods of applying stress to glass, fracture always takes place in tension."

Constitution of Glass

The final chapter of the book is on the atomic structure of glass, and it begins: "Little is known about the constitution of glass, when by that term is meant the details of atomic and molecular arrangement and spacing, and whether or not the atoms or atomic groups are randomly distributed or grouped into assemblies corresponding to definite compounds." All this is said to be, because glass is a frozen solution and no one has yet developed a theory to account for such structures, although adequate theories for silicate crystal structures have been developed. In this respect, therefore, there appears to be some resemblance to the present state of knowledge of hardened cement, which while not a frozen liquid is a near relative since it is colloidal, or amorphous in a similar way. All that is known about soda-silica glass is that the silica tetrahedra form a three-dimensional somewhat irregular network, with the sodium ions apparently more or less randomly spotted in holes in the silica structure. Some of the oxygen ions are bonded to only one silicon ion, which accounts for the readiness with which glass melts. The sodium and calcium ions thus spotted in the holes of the network are called "network modifiers," as distinct from the silicon and oxygen ions which are "network formers." In this respect there is reason to believe some kind of a parallel exists in the case of set cement.

Scope of the Book

Thus far we have touched on or commented on only such features as might help in the study of silicates in general. For those really interested in glass, the scope of the text is best shown by the following chapter heads: General introduction; preface; history and definition; devitrification; composition; chemical durability; viscosity; annealing; surface tension; heat capacity; thermal conductivity; density; coefficient of expansion; elastic properties; strength; thermal endurance; hardness; optical properties; electrical conductivity; dielectric constant; dielectric loss; dielectric strength; magnetic properties; constitution.

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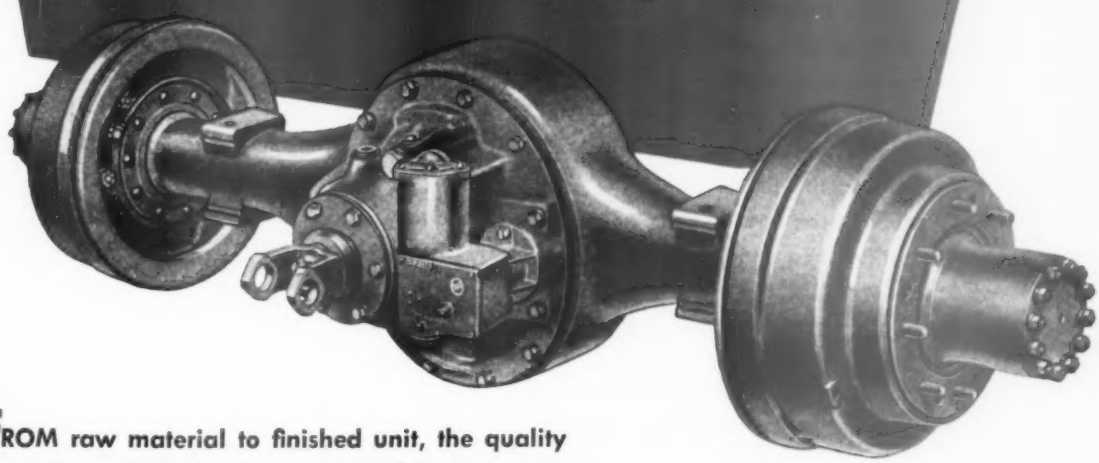

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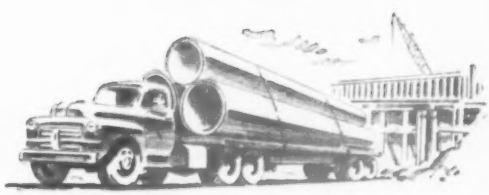

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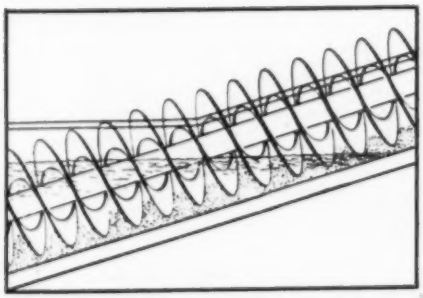

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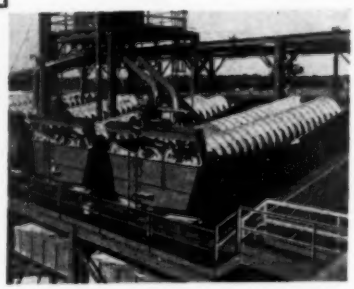

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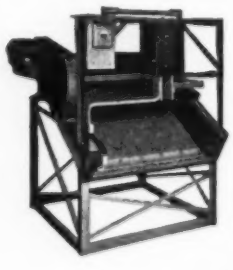

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Labor Relations

(Continued from page 51)

tion of the contract, whichever occurs later. The "expiration date" includes the agreed upon date in the course of the contract's existence when the parties may reopen it to make changes. The Board now holds that a union unlawfully refuses to bargain if it calls a strike in support of contract changes without notifying the Federal Mediation and Conciliation Service of the existence of a dispute within 30 days after the notice is given to the employer.

Employer Group Contracts

The decision of the N.L.R.B. in the case of the Buffalo Linen Supply, Inc., dated July 26, 1954, reads as follows: "The respondents-employers, together with Frontier Linen Supply, Inc., are members of the respondent-association, Linen and Credit Exchange (hereafter called the association). Pursuant to collective bargaining on a multi-employer basis for approximately 13 years, the respondents and the union have been parties to successive collective bargaining agreements* covering the truck driver employes of the respective employers. Prior to the expiration of the contract, containing an automatic renewal clause, which was to expire on April 30, 1953, the union notified the respondents of its desire to open negotiations to change the agreement.

"Thereafter, the parties negotiated unsuccessfully for a new contract, and, on May 26, 1953, the truck drivers employed by one member of the association, Frontier, went on strike and picketed Frontier's plant. On May 27, the remaining association members laid off their truck drivers after advising the union that the layoff action was the result of the strike of Frontier's plant and that the employes would be recalled if the union withdrew its picket line and ended the strike at Frontier. In the meanwhile, the parties continued their bargaining negotiations, and on June 3, the union and the association executed a new contract, respectively terminated the strike and the lockout, and the truck drivers of the various employers returned to work.

"As pointed out by the Trial Examiner, the foregoing facts, mainly stipulated, present the case 'largely in a vacuum'. From these facts, and in

*Negotiations on these contracts were conducted between representatives of the association, acting on behalf of all its employer-members, and representatives of the union. After agreement by the respective representatives on a proposed bargaining contract, the proposal was submitted for approval to the members of the association and the union. Upon approval of the proposed agreement by the individual members of the association and the union, the agreement was signed by each employer-member of the association and by officials of the union.

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Watch a MICHIGAN Tractor Shovel at work —with particular attention to bucket action —and you'll *see* how a MICHIGAN* will *handle bigger loads, move more yardage*—faster, at considerably lower cost.

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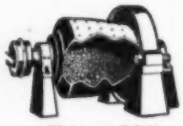

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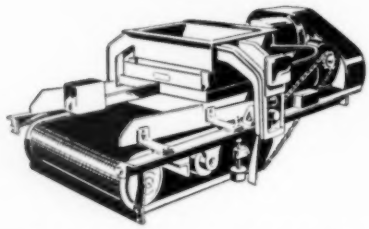

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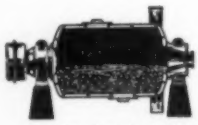

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the *absence* of specific evidence showing that the strike was likely to spread to the nonstruck employers, the Trial Examiner, by reliance upon certain prior Board decisions, inferred that the employers who were not struck engaged in unlawful retaliatory conduct. However, in these circumstances, we think the more reasonable inference is that, although, not specifically announced by the union, the strike against the one employer necessarily carried with it an implicit threat of future strike action against any or all of the other members of the association. For, the union's action represents a similar technique of exerting economic pressure to atomize the employer solidarity which is the fundamental aim of the multi-employer bargaining relationship. The calculated purpose of maintaining a strike against one employer and threatening to strike others in the employer group at future times is to cause successive and individual employer capitulations. Therefore in the absence of any independent evidence of antiunion motivation, we find the respondent's action in the strike at Frontier was defensive and privileged in nature, rather than retaliatory and unlawful.

"Contrary to the assertion of our dissenting colleague [Murdock] our decision herein does not establish that the employer lockout is a corollary of the employes' statutory right to strike. Upon the facts of this case, we find it unnecessary to pass upon that issue. We have done no more in this case than affirm the legal concept by the Ninth Circuit Court of Appeals in the Davis Furniture case, which provides that a strike by employes against one employer-member of a multi-employer bargaining unit constitutes a threat of strike action against the other employers, which threat, *per se*, constitutes the type of economic or operating problem at the plants of the nonstruck employers which legally justifies their resort to a temporary lockout of employes."

Accordingly the complaint of the Truck Drivers Local Union No. 449 of the International Brotherhood of Teamsters, Chauffers, Warehousemen and Helpers of America, A.F. of L., was ordered dismissed.

Cement Film

CALAVERAS CEMENT CO. has released a 16 mm. sound and color motion picture film giving the history of cement processing and illustrating quarry and mill operations at its San Andreas, Calif., plant. The film, entitled "Gray Gold from the Mother Lode," is available without charge from Mel J. London, vice-president, Calaveras Cement Co., 315 Montgomery St., San Francisco 4, Calif.

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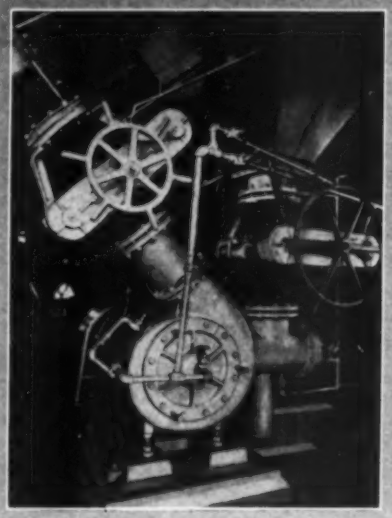

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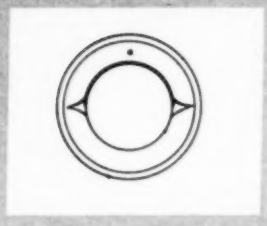

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MANUFACTURERS NEWS

ST. REGIS PAPER CO., New York, N. Y., announces that Hugh W. Sloan, vice-president of St. Regis Paper Co., (Canada) Limited, succeeds Thomas H. Cosford as managing director of the Canadian company. Mr. Cosford has retired but will continue as a director and consultant. Mr. Sloan had been assisting Mr. Cosford for the past year and had formerly served as assistant to Arch Carswell, vice-president in charge of sales of St. Regis. Prior to that he had been Pacific Coast manager for the multiwall bag division.

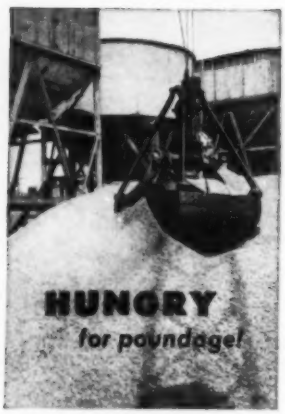
Hugh W. Sloan

GARDNER-DENVER CO., Quincy, Ill., has announced the election of Gifford V. Leece as president and Benjamin C. Essig as executive vice-president. Mr. Leece, who joined the company in 1922, has been vice-president and sales manager since 1947. Mr. Essig has been associated with Gardner-Denver since 1923 and has for some time served on the executive committee.

FRUEHAUF TRAILER CO., Angola, Ind., announces that Roy Fruehauf, president, was recently awarded the honorary degree of Doctor of Commercial Science at the 70th annual commencement of Tri-State College, Angola, Ind.

MARION POWER SHOVEL CO., Marion, Ohio, has acquired controlling interest in The Osgood Co. and its subsidiaries, The General Excavator Co. and The Commercial Steel Castings Co., according to an announcement by John P. Courtright, president of Marion Power Shovel Co.

LE ROI CO., Milwaukee, Wis., has organized a municipal sales department under the management of Guy



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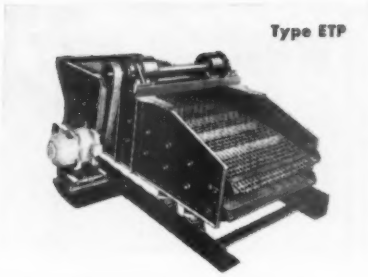
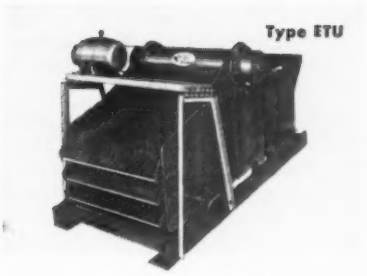
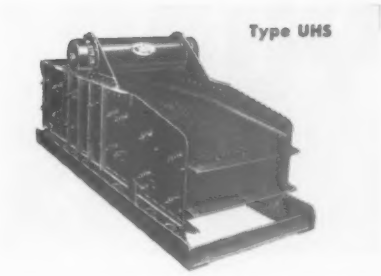
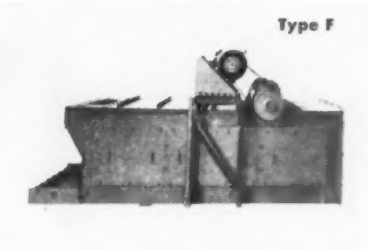
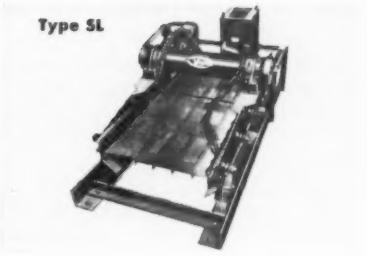
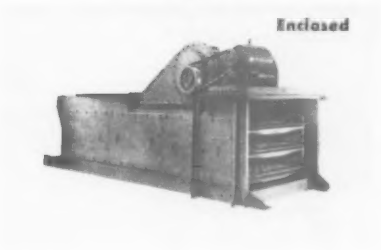












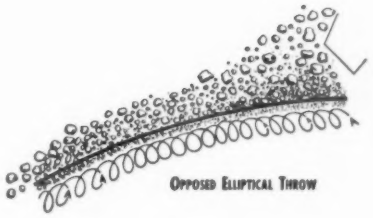
Which is the Best Screen for your job?

Combine today's *more exacting specifications* with *increasing competition* and you have two primary reasons why aggregates producers are turning to screens *designed to fit each specific job.*

As *specialists* in the design, manufacture and installation of vibrating screens, the Deister Machine Company offers a size and type to provide greatest efficiency and more trouble-free operation *on any specific job.*

Six types of Deister vibrating screen machines are shown above. Models and special application features on these machines are:

- *Type ETP.* This is the long proven Deister pillow-block, *end-tension* type vibrating screen. Available in 2½′ x 4′ size through 4′ x 8′ size screen. Over-size, heavy-duty, self-aligning spherical roller bearings mounted in labyrinth type housing, on top of frame away from direct contact with dirt, grit and moisture.
- *Type ETU. End-tension,* with unitized vibrating mechanism is available on 4′ x 8′ and larger size screens. Lifetime vibrating mechanism is demountable and readily inter-changeable as a unit. Renewable sleeves prevent wear on shaft and bearing housings.
- *Type UHS.* Heavy-Duty Scalping Screen has lifetime unit vibrating mechanism and features *side or transverse tension.* Divided screening sections identical in size permit shifting to distribute wear. Different size openings may be used on same deck. Built in 3, 4, and 5 foot widths; 10, 12, and 14 feet long and in single, double, and triple deck sizes.
- *Type F.* Horizontal vibrating screen. Developed by Deister especially for those installations where there is not sufficient headroom to permit the use of an inclined screen. Features the Deister Drop Deck providing greater screening area for the critical sizes.
- *Type SL.* Ag-Lime Screening system. Handles fine damp materials at high capacity without blinding. Much longer stroke, and higher speed, with graduated stroke feature assures more efficient sizing of sticky materials or extreme fines.
- *Enclosed.* Open top screens illustrated in this series are standard construction. Deister specialists are equipped to furnish screens requiring complete enclosing when needed in specific applications.



Deister screens grade faster, better because of Deister's exclusive opposed elliptical throw, which is illustrated above. This movement accurately controls the movement of material on the screen . . . at the input end the material is quickly stratified and moved forward rapidly to spread the load. As the discharge end is approached, the elliptical path leans backward. This has a retarding effect . . . and retains the near size material for maximum grading while the oversize is rapidly discharged.

Low screening angle on Deisters results in greater efficiency and minimum head room requirements. Long screen cloth life is yet another Deister feature . . . and vibration is *fully cushioned.* Specially designed oversize compression springs confine vibration to the screen itself.

Deister—a *pioneer* in the specialized design of machinery for the aggregates industry—has developed over 100 models of vibrating screens, which are available to fit any screening problem. Standard screens come in a variety of 1, 2, and 3-deck types in sizes from 2½ x 4 to 5 x 14. All screens can be furnished with the Deister Electric Screen Heater.

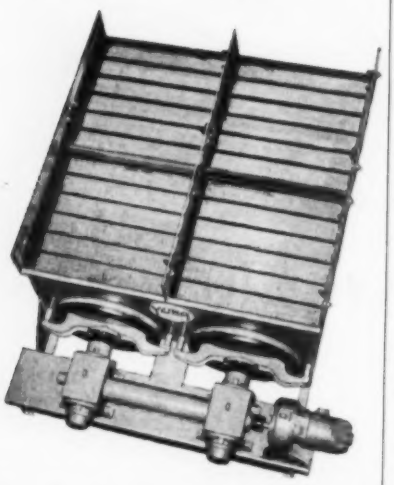
Whatever your screening problem, call on Deister . . . your result will be a *more profitable operation.*

DEISTER

DEISTER MACHINE COMPANY 1933 East Wayne Street, Fort Wayne 4, Indiana

YUBA JIGS

for black sands



Handle any material that can be concentrated, such as

CASSITERITE	RUTILE
GOLD	SCHEELITE
PLATINUM, ETC.	GARNETS
MONAZITE	SAPPHIRES
ZIRCONIUM	IRON
ILMENITE	COPPER

YUBA jig action is positive. Just set to desired speed and stroke, get constant uniform pulsations that create surface action over full area of jig bed. Result: YUBA M-8 jigs have large material capacity per flow line under full control.

Stroke adjustments between ¼" minimum and 3" maximum are easily and quickly made. Maximum frequency of a 4 cell M-8 jig is 350 at ¼".

YUBA jig design saves space, increases production in new or old dredges or mills. Use to supplement existing jigs or replace other concentration methods. For details of adapting YUBA jigs to your operation, send us data on ore, feed sizes and present installation.

76

YUBA DREDGES — PROVED DEPENDABILITY

YUBA MANUFACTURING CO.

Room 717 • 351 California St. • San Francisco 4, Calif.

Scrivner, who has been sales engineer in the Midwest for the past two years. Previous to that he was advertising manager for four years.

THE T. L. SMITH CO., Milwaukee, Wis., announces that Robert W. Smith has been elected president to succeed his father, the late Harold E. Smith. Mr. Robert Smith, who is also a director, has been serving as vice-president for the past six years. He is the third generation of the family to preside over the company.

WORTHINGTON CORP., Harrison, N. J., has announced the appointment of G. A. Navrotsky as manager for the Middle East, with headquarters in Istanbul, Turkey.

ST. REGIS PAPER CO., New York, N.Y., announces that Logan G. Hill and A. A. Roetzer have been appointed assistant general sales managers of the multiwall packaging division.

HAMMOND BAG & PAPER CO., Wellsburg, W. Va., has appointed Harold S. McCormick, Jr., as special representative in the fertilizer and chemical industries. He was formerly with H. J. Baker & Bro.

GENERAL ELECTRIC CO., Syracuse, N. Y., has appointed James D. Helm as sales manager for mobile communication equipment and special accounts, with headquarters at Electronics Park, N. Y.

GAR WOOD INDUSTRIES, Wayne, Mich., has transferred domestic and export sales for Gar Wood shovels and cranes and Buckeye ditchers, spreaders, finegraders and Hi-Way wideners from Findlay, Ohio, to Wayne, Mich., as part of a reorganization program.

HAMMOND BAG & PAPER CO., Wellsburg, W. Va., announces that all sales activities for the company will be handled from Chicago through J. E. Cornell, Jr., and W. A. Sheets, who will service accounts in Michigan and throughout the present territory.

CLEAVER-BROOKS CO., Milwaukee, Wis., announces the appointment of the Harold R. White Co., Baltimore, Md., as distributors in Washington, D. C., western Maryland, northern Virginia and West Virginia counties of Berkeley, Jefferson and Morgan.

VULCAN IRON WORKS, Wilkes-Barre, Penn., has announced the appointment of Alan R. Fisher as engineer in the process equipment division.

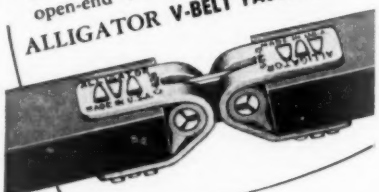
GARDNER-DENVER CO., Quincy, Ill., announces the election of John W. Gardner as a director of the company.

GENERAL AMERICAN TRANSPORTATION CORP., Chicago, Ill., has announced the purchase of Fuller Co.,

WHICH V-BELT is best for you?

If the correct size of endless V-Belt is not readily available, or if you have to tear down machinery to install, then the best belt to use is open-end V-Belting fastened with

ALLIGATOR **V-BELT FASTENERS**



★ In this way you can make up V-Belts in *any length* to fit *any drive* the fast economical way — V-Belts that perform exceptionally well.

★ In contrast to link-type belts these ALLIGATOR fastened V-Belts have just *one* strong joint . . . *stretch and follow-up maintenance are reduced to a minimum.*

ALLIGATOR **INTRODUCTORY V-BELT DRIVE UNITS** contain V-Belting, Fasteners and Tools — everything you need in one compact package to make up V-Belts quickly. Available in sizes A, B, C & D.

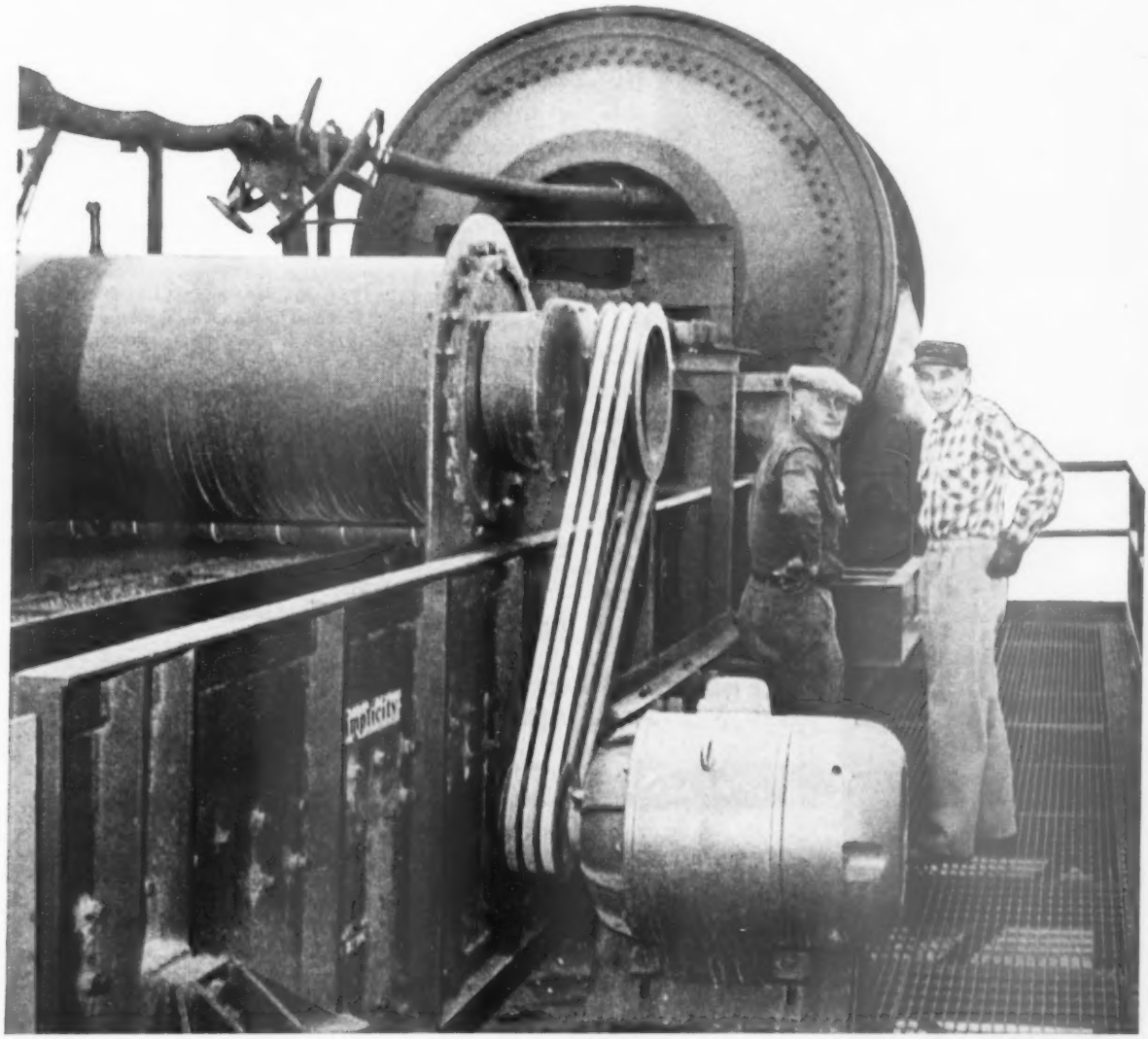
Ask for Bulletins V-215 and V-216
Order From Your Distributor

FLEXIBLE STEEL LACING COMPANY
4684 Lexington Street, Chicago 44, Illinois

ALLIGATOR
V-BELT FASTENERS

Simplicity screens play important part in remarkable new "sink-float" plant producing improved gravel

Progressive sand and gravel plants throughout the country are turning to the "sink-float" or heavy media separation method to produce an improved quality grade of gravel. This method insures the positive elimination of troublesome non-durable materials. The installation shown below was made by the Western Machinery Co. of San Francisco, Calif., at the Harry Pickett plant, Northville, Michigan. An important unit in this installation is a Simplicity 6' x 20' Horizontal Screen, one of the biggest of its type in operation today. This installation features a divided screen with ¾ of the deck carrying clean, concentrated gravel while the tailings move over the other ¼. Screen action and a secondary spray system assures positive media recovery over the 20' travel. Get complete information on Simplicity screens and other equipment by contacting your nearest Simplicity sales representative or write us in Durand, Michigan.



150

Sales representatives in all parts of the U.S.A.

FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario

FOR EXPORT: Brown and Sites, 50 Church St., N. Y. 7, N. Y.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND, MICHIGAN

GYROSET VIBRATING SCREENS
FOR
SIZING — DEWATERING

POSITIVE ECCENTRIC ACTION
POSITIVE STROKE ADJUSTMENT

WITH ONLY
2 BEARINGS

For scalping and for raw material sizing. A rugged two bearing positive eccentric screen. Adjustable as to stroke from 0 to 3/8" for efficient economical service.

PRODUCTIVE EQUIPMENT CORP.
2926-28 W. LAKE ST. CHICAGO 12, ILL.

MORE ECONOMICAL BREAKAGE

2000 TO 12000 LBS.

WITH THE **"CAPE ANN"**
FORGED STEEL DROP BALL

HIGHLY EFFICIENT SECONDARY BREAKAGE MEANS—MORE TONNAGE—MORE PROFITS

The "Cape Ann" Forged Steel Drop Ball is noted for its long life and better wearing qualities for use in secondary breakage. It is "TOPS" in the drop ball field where constant pounding day in and day out make it absolutely necessary that ruggedness and dependability be the key factor to insure maximum production.

NO DELAYS . . . WE SHIP IMMEDIATELY

WRITE FOR PRICES AND INFORMATION

CAPE ANN ANCHOR & FORGE CO.
Post Office Box 360 Gloucester, Mass.

Catasauqua, Penn., through an exchange of General American common stock having a market value in excess of $9,000,000 for all of the outstanding stock of Fuller Co., which is held by two Fuller brothers, J. W., president, and C. Thomas, vice-president.

IOWA MANUFACTURING CO., Cedar Rapids, Iowa, has announced the appointment of Joe A. Wicke as advertising manager. Formerly assistant advertising manager, Mr. Wicke joined the engineering department in 1942. His service with the company was interruped by three years in the Air Force during World War II. He returned to Iowa after his discharge and was made assistant advertising manager in 1950. He attended Rockhurst College, Kansas City, Mo., and the University of Iowa in Iowa City. William E. Yount, Jr., who has been a member of the advertising staff since 1953, has been named to succeed Mr. Wicke as assistant advertising manager. He is a graduate of Oklahoma A & M College, Stillwater, Okla.

Joe A. Wicke

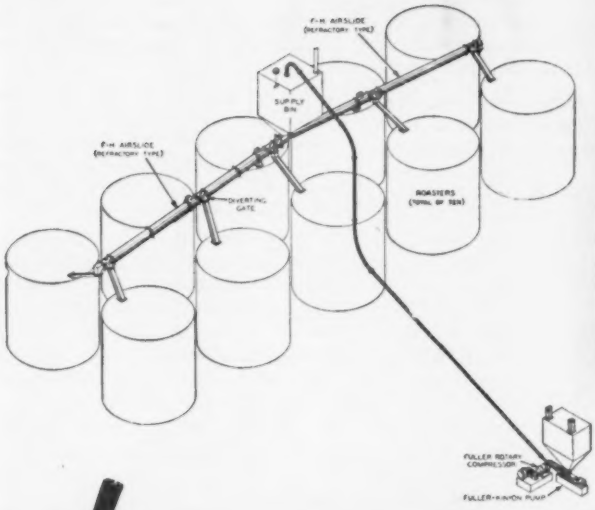
AMERICAN ROAD BUILDERS' ASSN., Washington, D. C., announces that William A. Roberts, president of Allis-Chalmers Mfg. Co., Milwaukee, Wis., and a past vice-president of the A.R.B.A., has been selected by President Eisenhower to serve on the advisory committee on the $50 billion, 10-year national highway program. Gen. Lucius D. Clay (U.S.A. - ret.) is chairman of the committee.

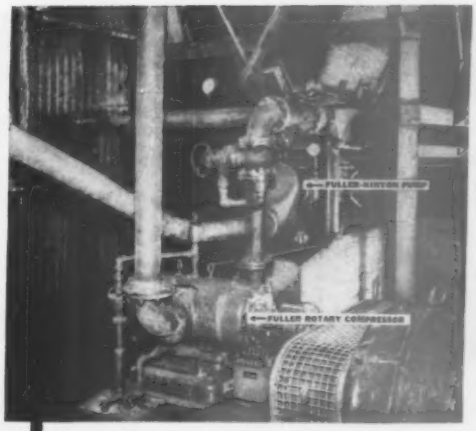
BUCYRUS-ERIE CO., South Milwaukee, Wis., has appointed George L. Read as Canadian sales manager in all Provinces of Canada east of and including Saskatchewan, with headquarters in Toronto, Ont., Canada.

HERCULES POWDER CO., Wilmington, Del., has named J. Henry Schindler, Jr., as manager of export sales of explosives, with headquarters in the New York office. He succeeds J. R. St. Clair, who has retired after 35 years of service with the company.

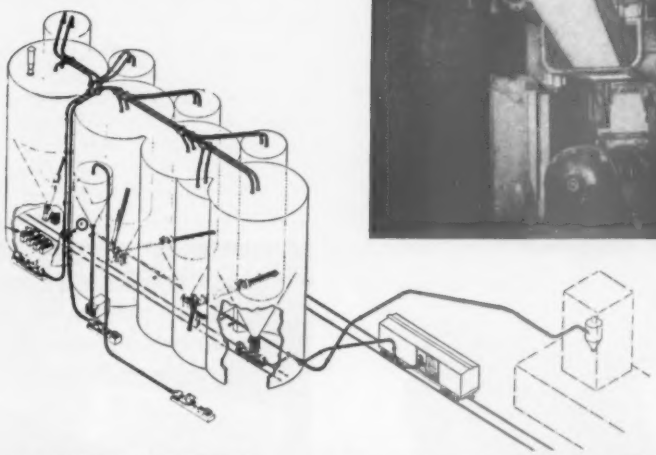
LEE RUBBER & TIRE CORP., Youngstown, Ohio, announces that J. A. MacIntire, Jr., has been appointed Chicago district manager for the Republic rubber division. He was formerly assistant manager of wire braid hose sales and succeeds M. W. Clark, who has retired after 40 years of service with the company.

INSLEY MFG. CORP., Indianapolis, Inc., announces that James R. Elliott, formerly executive vice-president, has





Hot or COLD



flue dust or talc convey it with FULLER-KINYON & F-H AIRSLIDE®

CONVEYING SYSTEM

Fuller

CONVEYS BY AIR

CLEAN...SAFE...EFFICIENT

Many conveying problems, heretofore considered impossible and impractical from an economic standpoint, are today being solved by the use of Fuller-Kinyon and F-H Airslide Conveyors, either individually or in combination.

Illustrated are two installations, each made practical and economical by the combination of these two systems . . . advanced designing and know-how by Fuller engineers experienced in the art of air-conveying for over a quarter of a century.

Installation, upper left, conveying hot flue dust. A Fuller-Kinyon Pump conveys from a precipitator to a supply bin. From the supply bin, F-H Airslides convey and control the distribution of the flue dust to roasters, with no dust or loss of material. Material handled has a temperature up to 800 deg. fahr. The pump conveys at rate of 25 tons an hour over a distance of approximately 220 feet.

Drawing, lower right, talc conveying. Fuller-Kinyon Systems convey from pulverizers to storage silos and bins, and from storage to packer bin or bulk-car loading. F-H Airslides convey from flat-bottom storage bins to the Fuller-Kinyon Portable Pump illustrated above drawing.

When it's conveying you need, you need a Fuller engineer to make a study of your requirements. His findings may result in advanced and practical ideas you never anticipated or thought possible. Write for literature on Fuller-Kinyon and Airslide Conveyors.

FULLER COMPANY—CATASAUQUA, PA.

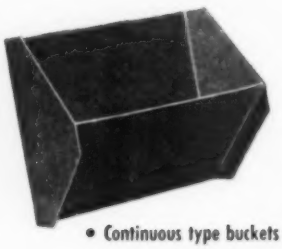
Chicago • San Francisco • Los Angeles • Seattle • Birmingham

G-91
2278

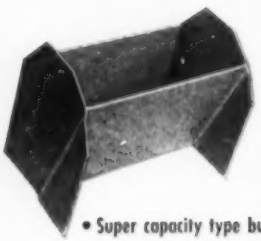
DRY MATERIAL CONVEYING SYSTEMS AND COOLERS . . . COMPRESSORS AND VACUUM PUMPS . . . FEEDERS AND ASSOCIATED EQUIPMENT

RUGGED AND DEPENDABLE AT low cost

• Salem type buckets



• Continuous type buckets



• Super capacity type buckets

Standard high quality steel elevator buckets are available in all styles, types, sizes and gauges for replacement as well as new installations. For real economy and immediate service, get acquainted with the Standard line today.

Write for new catalog showing the complete line of Standard buckets and prices.

The Standard Metal Mfg. Co. SINCE 1921

STANDARD METAL MFG. CO.
110 Center St., Malinta, Ohio

been elected president of the company. He succeeds William B. Elliott who has been named chairman of the board. William T. Elliott has been appointed executive vice-president.

LE ROI CO., Milwaukee, Wis., has announced the appointment of Jack E. Heuser as vice-president in charge of sales. He was formerly sales manager of the engine division. An engineering graduate of the University of Wisconsin, Madison, Wis., Mr. Heuser joined the company in 1939. Two years later he became a member of the Ampco Metal sales organization and served as manager of the Pittsburgh district and later the Los Angeles district. In 1946 he rejoined Le Roi as assistant to the general sales manager.

Jack E. Heuser

WORTHINGTON CORP., Harrison, N. J., announces that Jack Spratt Road Machinery Co., Wichita, Kan., distributor, has added portable compressors and contractor's tools to its line of Worthington construction equipment being distributed in Kansas counties of Harper, Sedgwick, Sumner, Butler, Cowley, Greenwood, Elk, Chautaqua, Woodson, Wilson, Montgomery, Allen, Neosho, Labette, Bourbon, Crawford and Cherokee.

W. W. SLY MFG., CO., Cleveland, Ohio, announces that Carl R. Sare, formerly vice-president and a director, has been named president of the company. He succeeds Frank W. Klatt, who has retired.

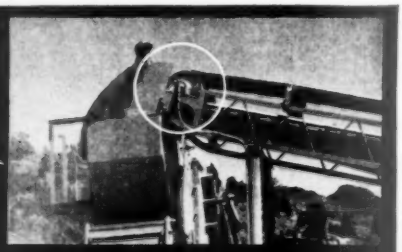
RAYMOND BAG CO., Middletown, Ohio, announces the appointment of James M. Green as sales representative in southern Indiana and the entire state of Kentucky, and A. P. Wolff as sales representative in northern Indiana and the entire state of Michigan.

JOY MFG. CO., Pittsburgh, Penn., has elected John Lawrence as executive vice-president. He was formerly vice-president of manufacturing and engineering.

H. K. PORTER CO., INC., New York, N. Y., has announced the appointment of L. Jack Clarke as general sales manager, Leschen wire rope division. He was formerly manager of the New York sales district.

NAGLE PUMPS, INC., Chicago Heights, Ill., has appointed the North East Engineering Co., Hudson Falls, N. Y., as sales representatives for eastern New York State.

Save up to 90¢ of your CONVEYOR MAINTENANCE DOLLAR with Cedarapids Schrock Built by IOWA



MOTORIZED HEAD PULLEYS

- No chains out in the weather and grit, so there's no chain failure, or chain idlers to keep adjusted and oiled.
- No V-belts to be constantly checked, adjusted and replaced.
- No shafts and drives to service and lubricate.
- No motors exposed to weather or damage.

ALL MOVING PARTS ARE INSIDE THE PULLEY SHELL

The reduction gears and electric motor . . . *the only moving parts* . . . are inside the pulley drum, fully enclosed and protected by the pulley shell. Wherever there are belt conveyors or belt-bucket elevator installations, Motorized Head Pulleys are the answer to your maintenance man's prayer.

THERE'S NO OTHER PULLEY LIKE IT! Call your Cedarapids distributor today about modernizing your plant with Motorized Head Pulleys.

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

Built for sale in Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah and Washington by
YUBA MANUFACTURING CO.
(Pulley and Sprocket Dept.) Benicia, Calif.

Plant	Average service Permanente Brick	Average service 70% alumina brick	EXTRA SERVICE with Permanente Brick
1	14 months	1 month	13 months
2	24 months	12 months	12 months
3	15 months	3 months	12 months
4	15 months	4 months	11 months
5	14 months	3 months	11 months
6	14 months	3 months	11 months
7	12 months	4 months	8 months
8	15 months	7 months	8 months
9	7 months	1 month	6 months
10	12 months	6 months	6 months
			Average: 9.9 months

Average 9.9 months extra hot zone life!

with Permanente Periclase-Chrome brick

THE FIGURES above were furnished by cement producers during a field check of a few of the many plants using Permanente Periclase-Chrome A burned brick. Plants checked have a total capacity of nearly 27 million barrels.

This dramatically improved service is possible because Permanente Brick is *especially designed* for hot zone linings to provide great volume stability under loading, high resistance to spalling and to chemical attack by cement clinker at high temperature. Think what this means in shutdowns eliminated!

In addition, Permanente Periclase-Chrome A Brick takes a good coating in the kiln, usually without inducement.

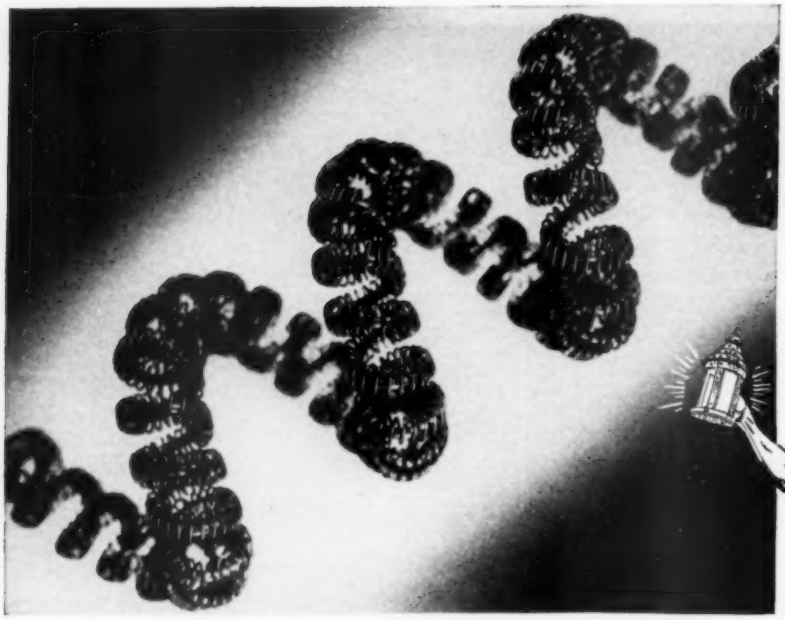
If you are not yet using Permanente brick, let us show you *now* how its superior performance can give you increased clinker production at lower cost!

Call or write *Kaiser Chemicals Division*, Kaiser Aluminum & Chemical Sales, Inc. Regional sales offices: OAKLAND 12, California, 1924 Broadway; AKRON 8, Ohio, First National Tower; CHICAGO, 518 Calumet Bldg., 5231 Hohman Ave., Hammond, Ind.

Kaiser Chemicals

Pioneers in Modern Basic Refractories

Basic Refractory Brick and Ramming Materials • Dolomite Magnesia • Magnesite • Alumina • Periclase



Shown at the left is a view of the triple-coil tungsten wire used in many modern fluorescent lamps. (Photo courtesy General Electric Lamps)

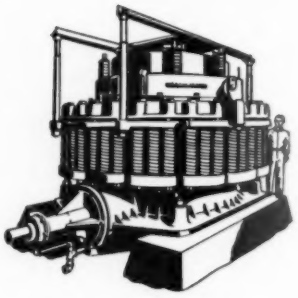
The "ARISTOCRAT OF RARE METALS" might have helped Diogenes . . .

If *TUNGSTEN*, the *"aristocrat of rare metals"*, had been discovered in his time, the Greek Cynic, *Diogenes* might have been able to carry a much brighter lamp to aid in his search for an honest man. For among the many contributions of this metal to modern civilization is the tungsten filament which gives a quality of artificial light otherwise unattainable.

Due to low grade characteristics, and the hard abrasive rock in which tungsten ore is generally found, producers must attain desired particle size for maximum recovery as quickly and economically as possible. It is significant to note the use of SYMONS® Cone Crushers by many of the large tungsten producers . . . who find these crushers particularly suited to tungsten ore reduction because of maximum utilization of crushing surfaces against the highly abrasive material, with minimum wear.

Thus, in tungsten operations . . . *as in all of the great ore and industrial mineral operations the world over* . . . SYMONS Cone Crushers are relied upon to efficiently produce great quantities of finely crushed product at low cost.

NORDBERG MFG. CO., Milwaukee, Wisconsin



SYMONS Cone Crushers...*the machines that revolutionized crushing practice*... are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

SYMONS . . . *A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD.*

C153

NORDBERG

CRUSHERS SYMONS SCREENS NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO
MEXICO, D.F. • LONDON • PARIS • JOHANNESBURG

SYMONS PRIMARY CRUSHERS

GRINDING MILLS

MINE HOISTS

SYMONS VIBRATING BAR GRIZZLIES and SCREENS

DIESEL ENGINES

what does

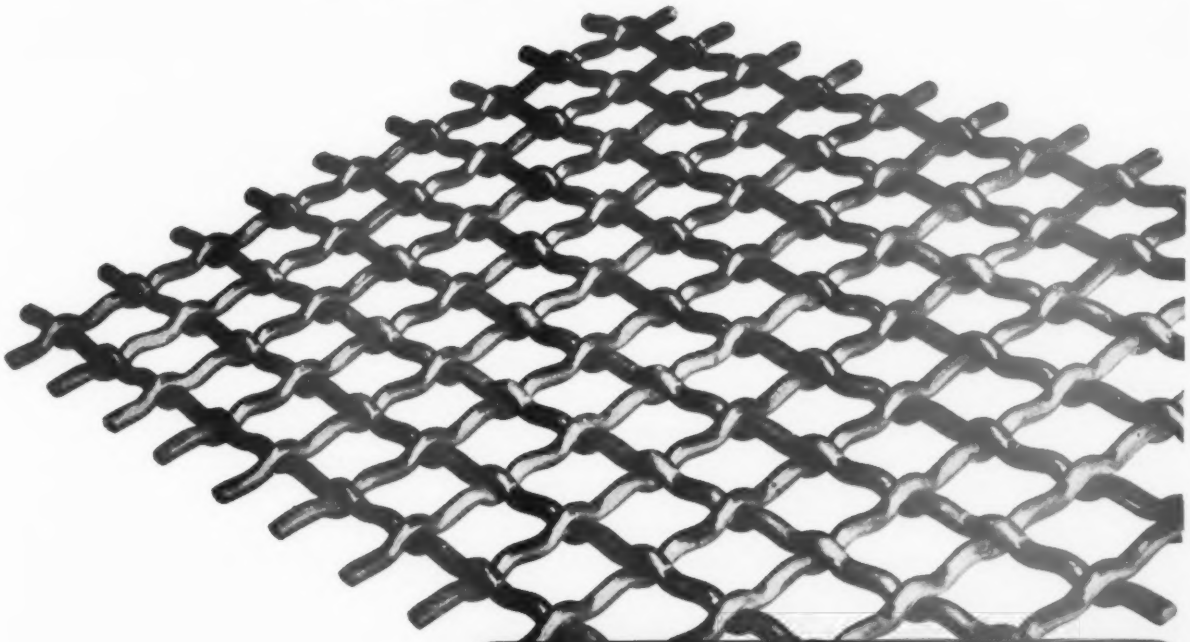
PRECISION

mean to you?

To us it means space screens that are built as tools of production.

- **Made from wire that is crimped to precision standards.**
- **Then woven extra tightly to maintain accurate, uniform spacing under the severest conditions.**
- **Results in *precision* openings that will maintain their accuracy under the severest vibration.**

Let us show you how Super-Tempered Precision Space Screens mean greater tonnage output per screen dollar.



SUPER-TEMPERED
PRECISION SPACE SCREENS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CF&I

THE COLORADO FUEL AND IRON CORPORATION—Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo
Chicago • Detroit • New Orleans • New York • Philadelphia

2468

LOW OPERATING COST SELLS 4 ERIE STRAYER BINS IN 6 YEARS TO FELTON BROTHERS TRANSIT MIX, INC., SOUTH BOSTON, VA.

Felton Brothers two-stop truck mixer plant. Includes 79-cu. yd., 118-ton 3-compartment aggregate bin and a 2-compartment 1025-bbl., cement bin. Felton Brothers operate plants in South Boston and Finchley, Virginia. Equipment sold by Marion S. Branch, Lynchburg, Virginia.

SELLING a customer one piece of equipment that satisfies him is no howling matter. After all, isn't that what one expects, satisfaction? But when a customer reorders 3 times in 5 years, we think it rates. Felton Brothers of South Boston, down in Virginia, did just that. They bought 4 bins in 6 years.

"We ordered our first Erie Bin," says president Dodson H. Felton, "back in 1948." It gave us very good service. Since then we've added 3 more, giving us, all told, 4 Erie Bins. We're pleased with their performance.

"Erie Bins are a one-man operation and call for very little upkeep. These two advantages help us to keep costs down, which is important in any business."

What we at Erie Strayer are doing for Felton Brothers, we're doing for hundreds of other operators. We can do as much for you. Let us show you how.

For further information, write Dept. P104. Cable Address: EXIMPORT

FORMERLY ERIE STEEL CONSTRUCTION COMPANY

ERIE STRAYER Co.

SAME PEOPLE • SAME PRODUCTS • JUST A NEW NAME

4104 Geist Road **Erie, Pennsylvania**

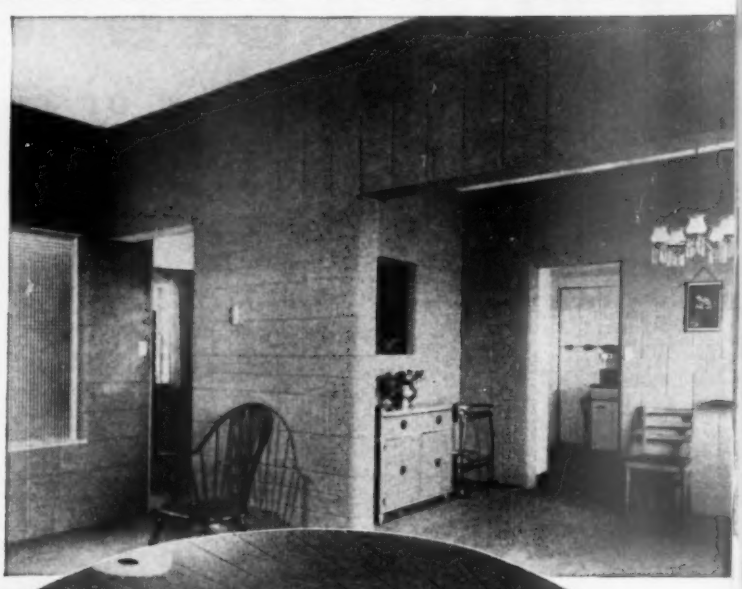
CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE

Ready-mixed concrete plant of Vowell Material Co., El Paso, Texas

Build Better with VIBRAPAC Block



for magnificent INTERIORS, *too!*

EVERLASTINGLY *beautiful*

Vibrapac Block, used extensively for *exteriors* of buildings, is equally adaptable to *interiors.* No other building material commands greater respect. In homes, and other structures, large or small, you know the colorful beauty, unique texture and ruggedness of Vibrapac Block is everlasting. Here is modern, practical, permanent construction that reflects good judgment and wins prestige.

PLUS LOW COST AND OTHER ADVANTAGES

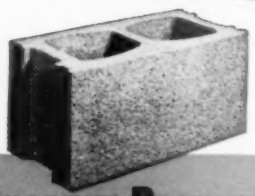
Obviously, Vibrapac Block are fire-safe and storm-safe, vermin and rodent proof. They insulate effectively against heat and cold . . . have great acoustical and soundproofing qualities . . . assure maximum economy in both first cost and maintenance cost.

VIBRAPAC PLANTS

This is one of a series of advertisements prepared by Besser and appearing currently in the Architectural and Building publications. We hope these advertisements will help Vibrapac Block Plants in developing new markets for Concrete Masonry, the modern building material.

BESSER
50th Anniversary
1904-1954

Vibrapac Block are produced only on BESSER Automatic High-Production Block Machines. Illustrated here is the new 2-core block with trussed center web . . . one of the many types and sizes made on a Vibrapac using only ONE set of Plain Pallets. Write for literature to Besser Manufacturing Company, Box 135, Alpena, Mich., U. S. A.



. . . a Half Century of Concrete Masonry Progress!

INDUSTRY NEWS

Lightweight Masonry Plant

TEXAS INDUSTRIES, INC., Dallas, Texas, is building a new block plant in Sweetwater, Texas, at a cost of approximately $250,000. The plant will produce Haydite lightweight masonry units and Holiday Hill stone with an annual production of approximately 1,500,000 units. Haydite aggregate will be shipped from the company's Eastland plant. The new plant will operate as Texcrete Co. of West Texas, and will serve a radius of 150 miles from Sweetwater. This area had been handled previously by the company's plant in San Antonio, Texas.

Cover Picture

THIS MONTH'S CONCRETE PRODUCTS COVER shows an illustration of the neat, compact ready-mixed concrete plant operated by Vowell Material Co., El Paso, Texas. This company has three plants in this area; a crushed stone plant, a ready-mixed concrete plant, and a bituminus mix plant. The illustration shows an International TD-14A crawler tractor pushing aggregate into a hopper which feeds the boot of a bucket elevator. The tractor, equipped with dozer blade, also is used to clean up around the stockpiles. J. C. Vowell is president of the company.

Concrete Pipe Project

PRICE BROTHERS CO., Dayton, Ohio, recently completed what was described as one of the most unusual concrete sewer pipe installations in the country. The sewer line runs from downtown Miami, Fla., across the bottom of Biscayne Bay to Virginia Key, an island 14,353 ft. off shore. Deep-sea divers, equipped with underwater telephones, directed the underwater activities incident to laying the 32-ton pipe sections.

Manufactured in 16-ft. lengths at the company's temporary Miami plant, two lengths of pipe were joined prior to installation, thus eliminating half of the underwater joint-making. The 32-ft. sections were hauled eight miles by truck to the dredge dock and loaded on barges. At the barge destination, two divers directed the derrick operator where to lay the pipe.

Laying of the steel-reinforced pipe was handled in a 4-stage operation: (1) A suction dredge removed the sludge, sand and silt from the bottom of the bay along the predetermined line; (2) a dipper dredge excavated a trench; (3) a derrick dredge placed a crushed stone bed, providing a uniform bearing for the pipe; and (4) another derrick dredge swung the sections over-side and lowered them to the bed. An average of six sections, or about 192 ft. of line were laid per day.

Adds to Product Line

NEVILLE CONCRETE PIPE CO., Pittsburgh, Penn., has expanded its facilities to include the production of Kem Krete block under the patented, precoating process developed by The Sherwin-Williams New Products Div., and licensed by The Krete Koater Service Co. The concrete pipe company is also installing equipment for the production of Zonatile, a lightweight, precast, insulating roofing tile, developed and licensed to producers by Zonolite Co., Chicago, Ill.

Attractive patio shown above, featuring various sizes of concrete block arranged in several patterns, was the first-prize winner, over 98 other displays, at the recent 4th Annual Metropolitan Louisville, Ky., Home Show. The display was entered by Kentucky Light Aggregates, Inc. Allan Taylor (right) vice-president, receives cup award from Marshall Guy, home show chairman

CLEVELAND BUILDERS SUPPLY CO., Cleveland, Ohio, recently acquired 3½ acres of river-front property on the west side of the Cuyahoga River, for present use as a storage yard and later as the site of a new ready-mixed concrete plant. The property, which has 475 ft. of dock space, reportedly was acquired for $245,000.

CLYDE J. KEYS INDUSTRIES, Saint Petersburg, Fla., recently completed a $250,000 expansion program begun early in the year and involving the construction of a new concrete block and ready-mixed concrete plant, and conversion of the old plant into a building materials supply center and warehouse.

THE PUMICE PRODUCTS AND BUILDERS INC., Boise, Idaho, has completed an addition which will provide 30,000 sq. ft. of warehouse, office and plant space. A high-pressure kiln has also been installed for curing pumice block.

IRVING MATERIALS, INC., Greenfield, Ind., has purchased the Parker Gravel Co. ready-mixed concrete plant at New Castle, Ind. A central mixing plant and larger trucks were added. Lee Sylvester is plant manager.

WEST TEXAS CONCRETE PRODUCTS, INC., Odessa, Texas, has decreased its capital stock from $100,000 to $40,000.

HOME CONCRETE SUPPLY CO., recently incorporated with $40,000, has started operation of its new concrete plant at Ulysses, Kan.

TROGDON CONSTRUCTION CO., Farmington, Mo., has established a ready-mixed concrete plant on U. S. Highway 67, near Farmington.

RICHARDSON LUMBER CO., Oregon, Mo., recently opened a ready-mixed concrete plant. Ray McIntyre and Orbyn Hughes are in charge of plant operations.

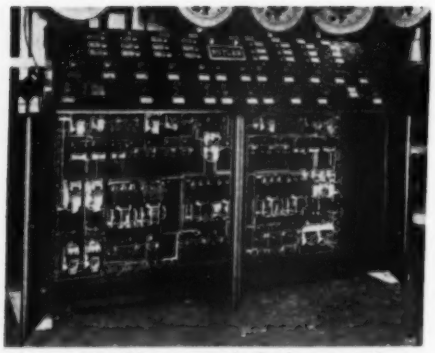
THE RANDOLPH COUNTY SUPPLY CO. has begun operations at its concrete block plant in Ridgeville, Ind. William Painter, owner and operator, also does general contracting.

MONTANA CONCRETE PIPE CO., Great Falls, Mont., has expanded its facilities to include the production of concrete block at a rate of 5000 units daily. Glen W. Schultz is manager.

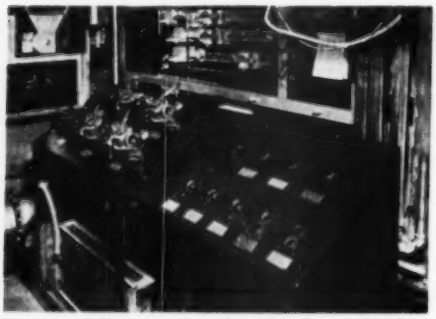
CLEMCO CONCRETE BLOCK CO., Kintzville, Iowa, has begun operations at its new concrete block plant.

PAUL BEGUELIN has taken over operations of the Allied Construction ready-mixed concrete plant in Waterloo, Iowa.

BELL CONCRETE PRODUCTS CO., Sulphur Springs, Texas, has added a batching plant to its ready-mixed concrete facilities.



Above. A highly automatic Butler control console interlocked electrically to foolproof precision in batching infinite combinations of 8 materials.

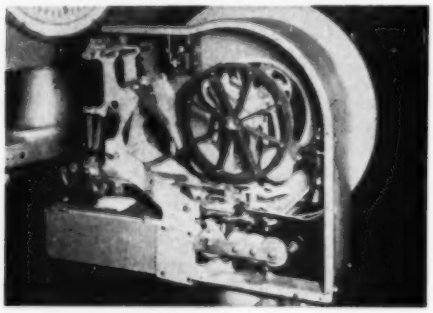


Here push-button control with air operated aggregate filling and discharge gates provide labor-saving assurance of uniform batch quality.

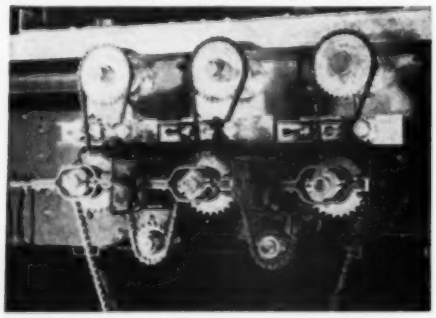
Plant under construction provides view of compact, well engineered batcher and mixer arrangement.

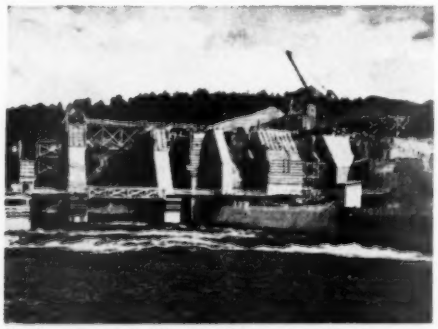
HIGH AUTOMATION Pays Off in Concrete Production

Butler provides automatically a printed record of every batch for the owner and his customers.



In many Butler plants air-operated clutches open gates to select any one of three types of cement.





Butler Central Mixing Plant on New Brunswick Dam job. This is one of many Butler plants used on Canada's huge hydro-electric expansion.

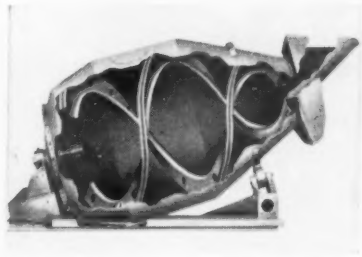
Automatic batching — whether for the highway or the ready mixed industry — has proved itself in elimination of wasted materials, sharp reduction of labor costs and faster production. Butler engineers have achieved high automation to bring concrete production in line with the economies of electronic controls in other industries. Existing ready mixed concrete or road builders plants can be easily and economically revised for automatic operation and, of course, new plants are readily engineered for highest efficiency at any production level.

Butler Bin Co.

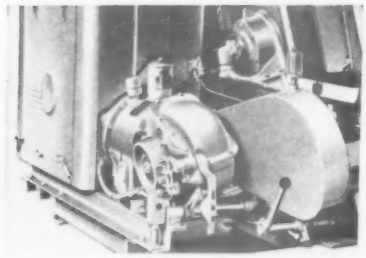
993 BLACKSTONE AVENUE
WAUKESHA, WISCONSIN

9 reasons why Jaeger Truck Mixers put more "pay" into payloads

1. More payloads, less downtime. Side-by-side comparisons prove Jaegers produce more actual payloads — not only full legal payloads per trip, but more daily payloads with the same plant and payroll. Operating records also show fewer hours per week on routine maintenance, fewer days per year on major upkeep.

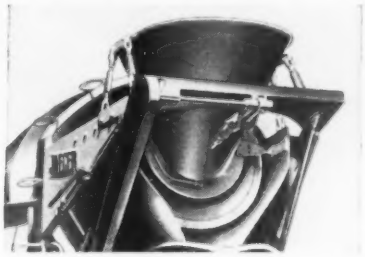


2. Compare Jaeger's exclusive "dual mix" drum. Produces uniformly higher strength concrete, gives fastest charging, mixing, discharging. Deeper, continuous spiral blades of special contour. *Built for 8 to 10 years' service*, with double 5/16" drum heads, 3/16" main cone and 10-gauge blades with exclusive bridge-truss feet.

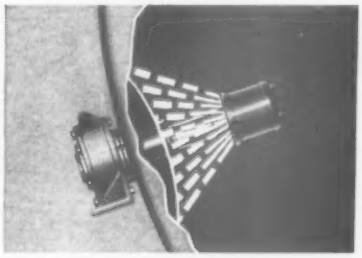


3. Perfected "Super-Comatic" hydraulically-actuated transmission — a Jaeger exclusive — provides single-lever control of clutches and brake, shock-proof shifting, automatic brake in neutral, positive clutch engagement. Dual (front and rear) levers give driver complete control of drum for mixing and discharge, speed operation.

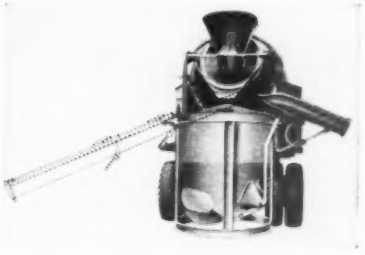
4. Compare Jaeger's open-end "Maxi-Loader". Faster, cleaner charging — 5 to 15 secs. per yd., depending on batcher and aggregates. Hopper has largest throat, deepest reach into drum. No cement blow-back. No spillage either, even on steep grades, quick starts. Deep-lipped discharge blades also produce faster, steadier discharge.



5. For maximum agitator payloads, compare Jaeger's sealed end loader with perfected grout-proof seal. Proven over 8 years. Takes fastest charge without blow-back and opens wide to discharge with one quick turn of a hand wheel. Built-in pressure system flushes seal with new lubricant whenever system is operated.

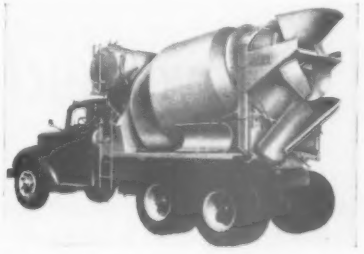


6. Faster, more uniform water distribution. High pressure water jet injects 60 gpm @ 65 psi to the mass of material *in the head of the drum.* Results in faster mixing, tempering, flushing. Jaeger 1½" pump and patented grout-proof and clog-proof jet insure unimpeded, high velocity flow at all times.



7. Compare Jaeger's 3-piece "to-the-spot" chute. Places concrete where customers want it. Chute head, plus 2 quick-coupling extensions, gives choice of 5′, 8′, 10′ or 13′ lengths. Chute head instantly swings to side for direct bucket discharge. No other truck mixer provides this flexible range of chute lengths.

8. Rugged, fast, dependable — both on and off the road. In a Jaeger "Mix-Plus" you can haul maximum payloads, charge, mix and discharge faster, and continue to enjoy these advantages through a life expectancy of 8 to 10 years, compared with the 4 to 5 years average life expectancy of cheaply-built mixers.



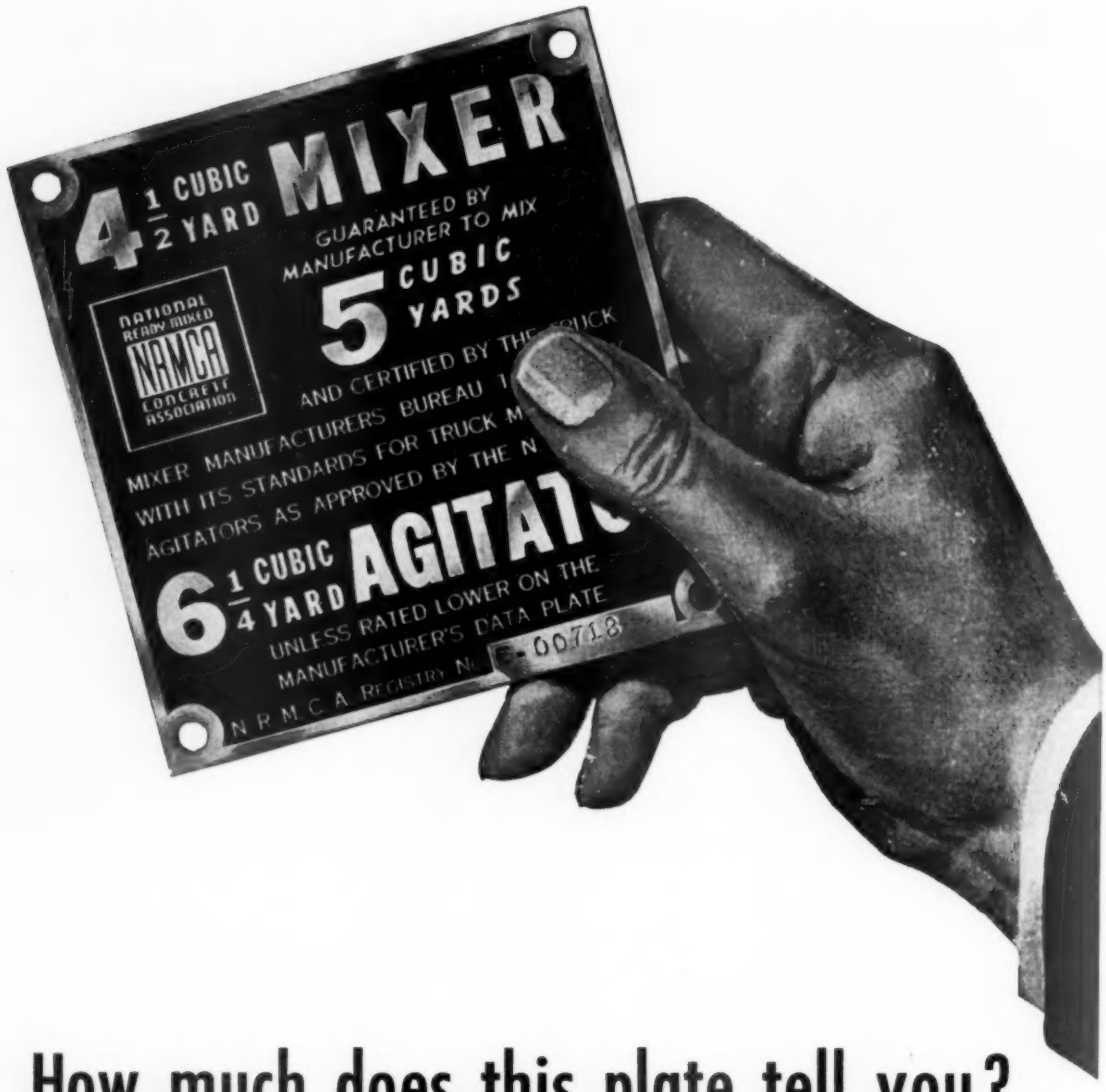
9. Optional choices of equipment of widest range enable you to meet your local condition, payload requirement, weight limitation and wet-mix or dry-batch operation with standard units readily mountable on standard makes of trucks. In all cases, Jaeger prices are based on furnishing a *complete* basic machine.

See for yourself how Jaeger truck mixers can cut your time and costs, speed your jobs. Your Jaeger distributor can give you complete facts on these and other Jaeger advantages. Or write for Catalog.

THE JAEGER MACHINE COMPANY

603 Dublin Avenue, Columbus 16, Ohio

LOADERS • AIR COMPRESSORS • PUMPS • MIXERS • PAVING MACHINES


4 1/2 CUBIC YARD MIXER
GUARANTEED BY MANUFACTURER TO MIX
5 CUBIC YARDS
NATIONAL READY MIXED CONCRETE ASSOCIATION
NRMCA
MIXER MANUFACTURERS BUREAU
WITH ITS STANDARDS FOR TRUCK M
AGITATORS AS APPROVED BY THE N
6 1/4 CUBIC YARD AGITAT
UNLESS RATED LOWER ON THE MANUFACTURER'S DATA PLATE
N.R.M.C.A. REGISTRY NO. E-00713

How much does this plate tell you?

To all well-informed architects, engineers and truck mixer buyers, this industry rating plate indicates much more than mixing and agitating capacities.

Through published standards, it establishes the actual drum volume within a variation of not more than 4 cubic feet, and also the permitted speeds for mixing and agitation. If the truck mixer is equipped with a water-measuring device, it guarantees measurement to be accurate within 1% of tank measuring capacity when standing level. It further guarantees the water system to be capable of delivering not less than the 45 gallons per minute specified for proper mixing results.

In short, it certifies compliance with industry standards arrived at through long experience and extensive technical studies.

We will gladly mail you a composite copy of these standards, and the new standards of the ASTM and NRMCA with which they are coordinated. Write direct to TRUCK MIXER MANUFACTURERS BUREAU, 1325 E St., N.W., Washington 4, D.C.

Member Companies

BLAW-KNOX EQUIPMENT DIVISION
Pittsburgh, Pa.
CHAIN BELT COMPANY
Milwaukee, Wis.
CHALLENGE MANUFACTURING CO.
Los Angeles, Calif.
CONCRETE TRANSPORT MIXER CO.
St. Louis, Mo.
CONSTRUCTION MACHINERY CO.
Waterloo, Iowa
IMPERIAL CONSTRUCTION EQUIPMENT CO.
Melrose Park, Ill.
THE JAEGER MACHINE COMPANY
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THE T. L. SMITH COMPANY
Milwaukee, Wis.
WORTHINGTON CORPORATION
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HEADQUARTERS FOR BLOCK PLANT EQUIPMENT

We make . . . .

- TRI-MATIC BLOCK MACHINE (1000 - 8" BLOCK PER HOUR)
- 50 Cu. Ft. MIXER
- SKIP HOIST
- FRONT PALLET RETURN
- HEIGHT & DENSITY CONTROL
- PALLET CLEANER
- REPLACEMENT PARTS

We also sell . .

- YARD-BIRD SWEEPER
- FORNEY TESTERS
- BLOCK SPLITTER
- LT. WEIGHT OFF-BEARER
- OPERATION TIME RECORDER
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We rebuild . .

- MOLD BOXES
- STRIPPER HEADS
- VIBRATORS
- PULLEYS, SHAFTS, etc.

FOR THE BEST IN EQUIPMENT AND SERVICE BY FOLKS WITH OVER 30 YEARS OF BLOCK MAKING AND MACHINE BUILDING EXPERIENCE, CONTACT . . . . .

BERGEN MACHINE & TOOL CO., INC.
NUTLEY, N. J.

IN CANADA: Construction Equipment Co., Ltd., Toronto
Halifax, Montreal, London, Edmonton

Add it up for yourself...

+ Haul Biggest Payloads In Any Area
+ Make Most Trips Per Day
+ Uninterrupted Operation, Free From Service Or Breakdowns
+ Economical First Cost...Based On Long Service Life
+ And Lowest Maintenance Cost

= BIGGEST PROFITS WITH REX ADJUSTA-WATE MOTO-MIXERS®

Just add up all these profit-making advantages you get *only* with Rex Adjusta-Wate Moto-Mixers...every day, every week, every month. The Adjusta-Wate principle alone offers the flexibility that reduces hauling, operating and delivery costs...performance that adds up to more profit for you.

Figure the Rex Adjusta-Wate for your operation. Compare it with any other. See it today at your Rex Distributor or write Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.

CHAIN BELT REX COMPANY

CONSTRUCTION MACHINERY

MOTO MIXERS · MIXERS · PUMPS · PUMPCRETES · PAVERS

Save more money by handling bigger loads

—with the world's largest standard lift truck—26,000 lbs.

The Clark-Ross Y-260 will handle bigger outdoor loads than any other lift truck, and it will go places where no other lift truck can travel! This truck is big enough to handle jobs which formerly required a crane and operator, hook man and trucker. It has the utmost traction and flotation—huge 14.00 x 20 tires are standard front and rear, with excellent weight distribution and 9 in. minimum underclearance. Its 17½ ft. turning radius permits it to be used in yards laid out for smaller trucks.

This Y-260 is *built* for 26,000 lbs. (at 36 inches)—not just beefed-up. It's as easy to drive as a truck half its size; power steering and power brakes are standard. And a brake selection switch enables the driver to apply brakes to *either* drive wheel, when one wheel has lost traction in slippery grounds. Maintenance access is excellent, wrap-around counterweight has minimum over-hang, operator visibility is outstanding. In general, *this lift truck is a beautiful brute!*

For big jobs, you'll want more details on the Y-260. Call your local Clark dealer, listed in the Yellow Pages under "Trucks, Industrial," or send the coupon.

CLARK EQUIPMENT

Industrial Truck Division
Battle Creek 60, Michigan

Send details on Y-260

Name_____

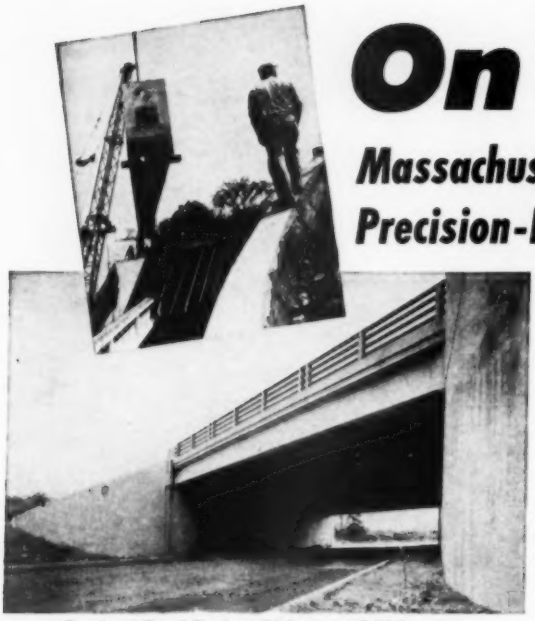
Firm_____

Address_____

City_____

On the Beam

Massachusetts Builds Handsome Bridges with Precision-Precast, Prestressed 'Incor' Concrete Beams — Spans up to 65 feet



Scotland Road Bridge: 24 beams of 65-ft. span, prestressed by Roebling method.

Hale Street Bridge: 18 beams of 64-ft. span, prestressed by Freyssinet method.

● In an area enshrined in yesterday's history, Massachusetts is today making construction history, with precast, prestressed bridges built with post-tensioned beams, spans up to 65 ft.

MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS has to date built seven prestressed bridges, using various methods of tensioning, as part of a far-seeing program. Four bridges, shown here, on Newbury-Newburyport Relocation of Route 1, have I-shape cross section, with depth-to-span ratios of 1:17 to 1:21. Beams are spaced 4½ ft. apart, decks cast in place. Overall lengths vary, but distance between diaphragms is constant.

Beams were fabricated by NEW ENGLAND CONCRETE PIPE CORPORATION under carefully controlled conditions, in an outdoor casting yard. Using 'Incor'* 24-Hour Cement, concrete was steam-cured, and even in cold weather, forms were stripped in less than 24 hours, and initial tension of 50 tons applied. The 4000 psi specified for full prestressing was attained in 24 to 27 hours.

Outstanding projects such as these re-emphasize the coming of age of prestressing, for important economies in concrete and reinforcing steel, as well as in erection. There is an inbuilt safety factor, too: During fabrication, members are subjected to greater loads than they take in the field. And concrete never has to be painted.

Designed for the material and method, not as a substitute for something else . . . with members cast to closest tolerances for fast erection . . . mass produced under controlled conditions—result, beautiful, enduring, economical structures to serve a highway-hungry nation.

*Reg. U. S. Pat. Off.

Design and Supervision
MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS
JOHN A. VOLPE, Commissioner
JOHN RUNDLETT, Bridge Engineer **H. G. GRAY**, Chief Engineer
General Contractor: **A. V. TAURASI CO.**, Boston
Beams Fabricated by: **NEW ENGLAND CONCRETE PIPE CORPORATION**
Newton Upper Falls, Mass.

Storey Avenue Bridge: 36 beams of 58-ft. span, prestressed by Lee-McCall method.

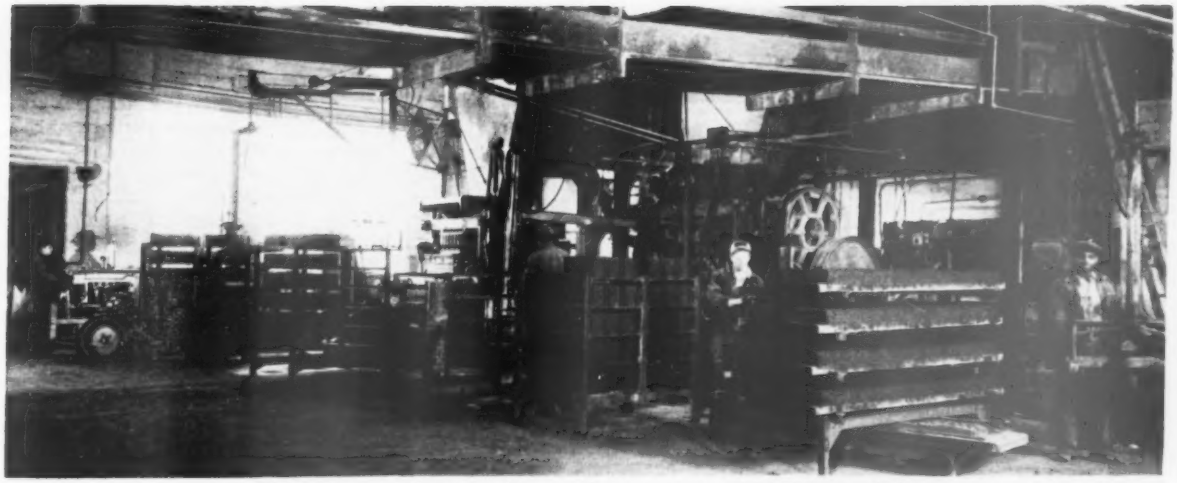
Pine Hill Road Bridge: 20 beams of 59-ft. span, prestressed by Prestressed Concrete Corp. method.

LONE STAR CEMENTS COVER THE ENTIRE CONSTRUCTION FIELD

LONE STAR CEMENT CORPORATION

Offices: ABILENE, TEX. • ALBANY, N. Y. • BETHLEHEM, PA.
BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON
INDIANAPOLIS • KANSAS CITY, MO. • NEW ORLEANS • NEW YORK
NORFOLK • RICHMOND • WASHINGTON, D. C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 18 MODERN MILLS, 136,000,000 SACKS ANNUAL CAPACITY



Two high capacity block machines produce an average of 12,000 units daily

Promotion Program Builds Concrete Block Business

• Cinder Products, Inc., Cincinnati, Ohio, has mechanized operations to reduce material handling to a minimum. Special lintel machine developed for these products

By HUBERT C. PERSONS*

THE GROWTH OF CINDER PRODUCTS, INC., pioneer manufacturers of lightweight concrete block in the Cincinnati, Ohio area, proves that consistent educational work can break down even the oldest traditions. When Cinder Products, Inc. began making cinder block by the Straub process in 1926, clay brick and natural stone were the traditional building materials in Cincinnati and throughout southern Ohio. Concrete masonry foundations were rarely seen. There wasn't any special prejudice against concrete masonry. Architects, engineers, contractors and masons simply didn't know much about it. Brick and stone had been used around Cincinnati for 150 years and nobody up to that time had made a strong effort to buck tradition.

A 28-Year Policy

But Edgar M. Johnson and Lee J. Workum had faith in concrete masonry, faith especially in the advantages of cinder block and other lightweight aggregate concrete masonry units. They realized, however, that making a good product of wide utility was not enough. Potential users had to be told about the product and informed as to its uses and special advantages. Through the 28 years of its history, Cinder Products, Inc., has followed the firm policy of keeping in close touch with architects, engineers, general contractors, home builders and real estate developers concerned with any project on which concrete masonry could be used. Systematic mailings are made of both technical bulletins and a variety of non-technical booklets and folders describing specific applications of lightweight aggregate block and sometimes suggesting new uses.

Cinder Products, Inc. has likewise followed a policy of selling block only

Cinder crusher building with belt conveyor, 150 ft. centers, inclining up to top of plant where cinders are dumped to bins over mixers. Conveyor to the left moves cinders from track hopper, and to the right is bucket elevator and secondary screen. Magnetic pulleys remove tramp iron from raw cinders

*Public Relations Consultant, formerly manager, Public Relations Bureau, Portland Cement Association.

Lintel machine which makes units with 4-in. variations up to 10 ft. long. Machine was developed in the plant by a Cincinnati manufacturer

through recognized building material dealers. Its interest in a project, however, has not ceased with the delivery of the block to the job. All projects are followed closely in order to assist contractors and owners in getting the best possible service from concrete block. The company also works with dealers in getting concrete masonry specified on important projects and often books an order and turns it over to a dealer. Recently newspaper advertising has been used.

The company's original plant was in Carthage, a Cincinnati suburb in the industrial Millcreek Valley. In 1942 the plant was moved to the present site at 5300 Este avenue in Elmwood Place, also a Cincinnati suburb. This well laid out and fully mechanized plant occupies a 7-acre tract of land on the Baltimore & Ohio Railroad with a 504-ft. siding adjoining the main manufacturing building.

Handling of Cinders

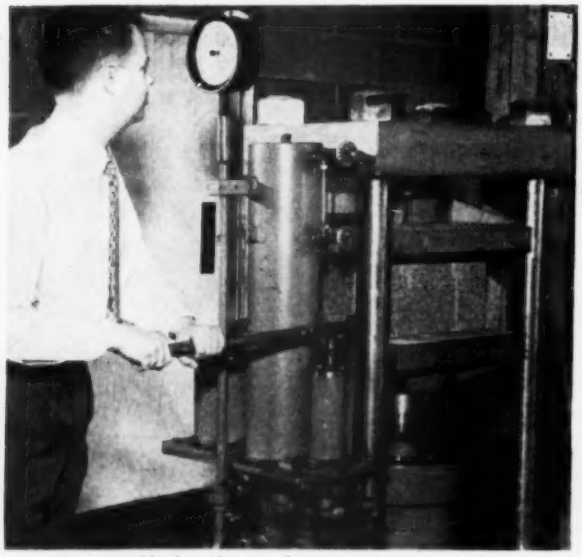
Raw cinders are delivered to the plant in hopper bottom railroad cars, and are either dumped directly over a grizzly into a pit under the track or unloaded into a storage area by a Barber-Greene conveyor. From 10,000 cu. yd. to 30,000 cu. yd. of both raw and processed cinders are stockpiled in the yards. From the pit, a belt conveyor carries the raw cinders as needed to a 200-cu. yd. overhead bin in the crusher building. This bin feeds the raw cinders to a 30-in. x 20-in. New Holland roll crusher. From the roll crusher the cinders are passed over two vibrating screens, one a New Holland and the other a Barber-Greene unit. Tramp iron in the cinders is removed by magnetic pulleys at several points, first at the car unloading point, again during the crushing and screening operation and finally above the storage bin.

Both bulk cars and trucks deliver portland cement to the plant. It is unloaded by gravity into an underground hopper and carried by screw conveyors to a 1,200-bbl. Heltzel cement storage bin.

Produce 12,000 Block Per Day

Two Besser Super-Vibrapac block machines are operated, producing a daily average of 12,000 8 x 8 x 16-in. equivalents. A Pre-Caster, making reinforced concrete lintels up to 10-ft. in length, is also operated. This was designed by Herman Barklage, plant superintendent and built by the A. R. Welding & Fabricating Co. of Cincinnati. Two 50-cu. ft. Besser mixers serve the block machines. A 12-ft. Stearns mixer is located over the lintel machine.

In addition to Straub process cinder block, the plant makes an expanded shale aggregate block under the trade name Kenlite, and an expanded slag aggregate block known as Amlite.



Concrete block under test for compression strength

Mixer platform and weigh batcher equipment. Mixer operator controls two elevated mixers over two block machines

Showing lift trucks with fork attachment for stacking cubed units in yard

The plant has five curing rooms, each 16- x 72-ft. Block are subjected to 250 deg. F. steam for 4 to 6 hr., then "soaked" in the curing rooms at 170 to 180 deg. through a 24-hr. curing cycle. Exhaust fans are used to pull steam from the curing rooms at the end of the curing cycle. The block are air dried in the yards for 28 days before delivery is permitted. There is 4580 sq. ft. of covered storage space.

Loaded racks are hauled from block machines to kilns and from kilns to cubing areas in yards by two Erickson platform lift trucks. Block is stacked or loaded on delivery trucks by Ross-Schmidgall expanding fork lift trucks and a Towmotor-Schmidgall expanding fork lift truck.

Promote New Uses

Cinder Products executives estimate that about 60 percent of the company's block production is used for backup in residential construction, but it is evident, that lightweight block is being left exposed more and more in both exterior and interior walls.

The company's executive offices, being built of various sizes of lightweight aggregate block laid in different types of masonry coursing, are a demonstration of the wide variety of architectural effects which may be produced with this versatile material.

A testing laboratory, completely equipped to make accurate compression tests, including all A.S.T.M. tests, is located in the manufacturing building. Constant laboratory tests are made to control the quality of all aggregates as well as finished block.

Officers of Cinder Products, Inc. are Edgar M. Johnson, president and Lee J. Workum, secretary and treasurer.

Awarded Safety Plaque

MATERIAL SERVICE CORP., Chicago, Ill., was recently awarded the National Safety Council's "Award of Merit Plaque" for its outstanding 1953 safety record. The presentation of the award was made at a special dinner ceremony attended by about 60 supervisory employes and executives of Material Service Corp., and several leading national and Chicago safety experts.

Presentation of the award was made by Robert D. Gidel, safety engineer, National Safety Council, and accepted by George Lenzie, operating vice-president, Material Service Corp. In presenting the award, Mr. Gidel revealed that Material Service Corp.'s injury frequency rate for 1953 was 29 percent lower than the industry "par" rate, and the injury severity rate was 25 percent lower. In addition to the company's excellent quarry and plant safety record, its 150 ready-mixed concrete trucks have reduced their accident rate to 30 percent of the 1951 rate. Milton Aronstam, Material Service safety director, stated that this outstanding safety record has been the result of increased support of the company's safety program by plant supervisors and top management. The program includes incorporation of safety features into equipment, safety meetings on company time, and a policy that makes safety as important as production.

In addition to Mr. Lenzie and Mr. Aronstam, Material Service Corp. executives attending the dinner included: Robert Crown, vice-president; Lester Crown, vice-president; George Kirp, general production manager; Arthur Proteau, director of personnel; and Alfred Rodriquez, assistant to the executive vice-president. Safety experts at the dinner, besides Material Service Corp. representatives and Mr. Gidel, included: L. J. Sorensen, City of Chicago traffic engineer; John Ahearn, president, Chicago Safety Council; Roy Benson, acting manager of the National Safety Council's Industrial Department; and Vincent Ahearn, executive secretary, National Sand and Gravel Association.

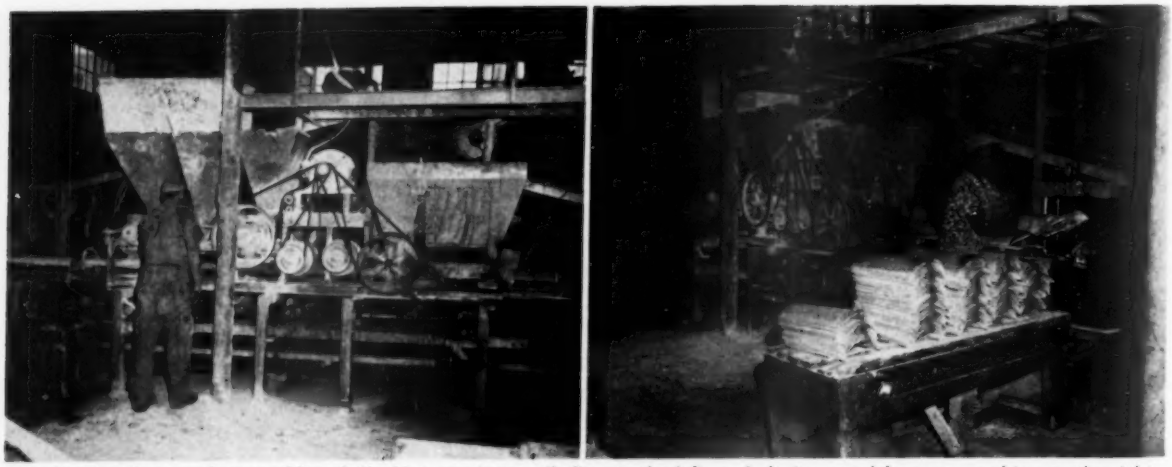
Robert D. Gidel (4th from left), National Safety Council safety engineer, presents "Award of Merit Plaque" to George W. Lenzie, operating vice-president, Material Service Corp., Chicago, Ill., in honor of company's outstanding 1953 safety record. Others of the group, left to right, are: Doug Kirp, assistant director of safety; Lester Crown, vice-president; George Kirp, general production manager; and Milton Aronstam, director of safety

Prestressed Pipe Booklet

PRICE BROTHERS CO. has published a 24-page booklet entitled "The Story of Concrete Pressure Pipe," giving the history of concrete in water lines, and its present application in prestressed concrete pressure pipe. There are 14 sections, one of which utilizes simple drawings to show the principles of tension and compression, and how prestressing permits near "zero" compression with the water line operating at design pressure. A catalog section lists and illustrates types of pipe for water transmission and distribution lines, subaqueous intakes and outfalls, and sewage force mains. Cutaway drawings of each type of pipe, with sizes, weights and normal operating heads are included. The booklet is available free of charge from Price Brothers Co., 1932 E. Monument Ave., Dayton 1, Ohio.

●

WESTERN CONTRACTING CO. has opened a temporary concrete batching plant near Hudson, Ohio, for supplying concrete for the turnpike project.



Machine for the manufacture of barrel tile. Note continuous tile line, to the left, and placing metal forms on machine, to the right

MASS Production of Concrete Roofing Tile

• Patent Tile Co., Ojus, Fla., to produce 36,000 roofing tile per day. Manufacture flat and barrel-type concrete tile in a wide variety of shapes and colors

By ROBT. B. KLEMAN

PRESENT PRODUCTION of over 22,000 roof tile per day, and an expansion program designed to increase production to 36,000 roof tile per day is the accomplishment and the aim of Patent Tile Co., Ojus, Fla. Patent Tile Co., a wholly-owned subsidiary of Giffen Industries of Coral Gables, is believed to be the largest manufacturer of roof tile in the United States, according to Steve Raymond, president of both organizations, and Thomas C. Roat, vice-president and manager of the tile company.

Present production includes barrel-type tile (patterned after the Spanish roof tile which, in its original form, was molded over the thigh of the workers), and also the flat cement shingle for the cement shingle roof that is so popular in Florida. These tiles are being produced in both a smooth and textured finish, and in a variety of colors. Rich and lasting colors are obtained by introducing oxide pigments into the concrete mix for the entire tile, as well as into the topping mix which finishes the exposed surface.

Make Variety of Tile

In addition to the two types of tile mentioned, the specials necessary for each of them are also made; that is, hip tile, eave starters and half starters, and finishers.

With the addition of two Besser-Anza roof tile machines now being installed, two new cement shingles will be added to the line. They will be a French Colonial shingle, and a Bermuda type tile in both 2-in. and 1½-in. modified; both types to be made in a variety of colors. The addition of this new equipment will increase production to a point where one day's normal run will roof 30 average-size homes.

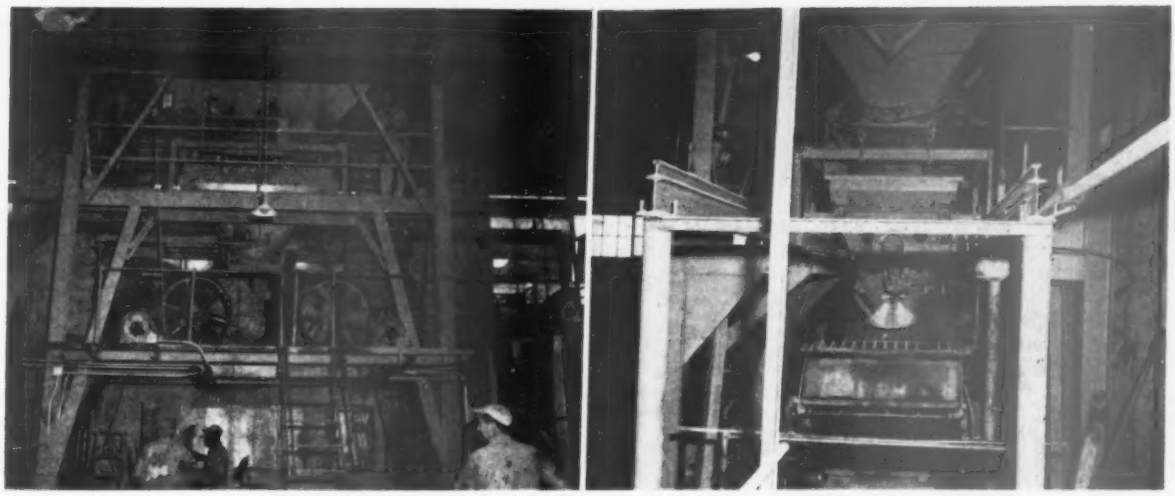
Production Line Methods

Upon entry into this well-planned production plant, one immediately gets the impression that personnel and material are following a predetermined plan, and are all moving in accordance with this plan. The materials are received at the east end of the plant, which is served by a railroad siding for the bulk cement, and by an unloading ramp for the aggregate which is brought in by truck. The material flows in a westerly direction straight into the plant, through the machinery, into the curing room and then out into the storage area which is on the western side of the plant.

High-early strength (bulk) cement is used on the theory that a faster cycle of use in pallets and other equipment can be obtained. However, at the present time, and in line with an expansion program, the company has built a series of new curing rooms in which low-pressure steam will be supplied. Regular portland cement will be used at an overall saving in tile production cost.

The aggregate unloading ramp terminates in a receiving hopper, which was designed and built by Giffen Industries, the parent organization. The aggregate itself is local limestone screenings which ranges in size between that of ordinary fine sand and regular screenings. This special grind modified screening, from $\frac{3}{16}$ in. down, is used because of the necessity of making sharply defined corners on tile.

The material flows from the bins into the specially-designed and built travelling weigh-hopper in the proportion of 280 lb. of cement to 1200 lb. of sand, or a ratio of about 4¼ to 1. When the material is accurately batched into this traveling hopper, it then moves on an overhead track to one of two Besser batch mixers now serving the two machines in operation. Two additional Besser batch mixers have been installed since this article was prepared. The four mixers are all served by this one traveling weigh-hopper



Traveling weigh batcher with mixers below. End view shown to the right

from the main Blaw-Knox batching equipment. There will be a batch mixer for each of the four machines in operation so that any particular type mix can be introduced to individual machines and controlled at the central weigh-hopper.

Steps in Manufacture

The traveling batch equipment was developed and produced by Metal Fabricating and Engineering Division of Giffen Industries, Coral Gables, Fla. The two original tile machines were developed by the Patent Tile Co. They consist of hoppers which feed the cement and aggregate onto a sleeve type metal form which is moving on a continuous belt. The individual forms are about 18 in. long and, when put end-to-end and covered with concrete, give the impression that it is a continuous long tile. As this tile material moves along the production line, it runs under a series of three heavy rollers; a packing roller, a cut-off roller, and a finish or slicking roller. Compression of the concrete causes it to become stronger in a shorter period of time and helps eliminate breakage. As the tile passes under another series of smaller hoppers, the finish material is introduced onto the surface of the tile.

The finish consists of a $\frac{1}{16}$-in. layer of white cement and lime and finely ground white silica sand, in a ratio of two parts white cement to one part lime and one part white sand. It then goes beneath a weighted trowel finish tool which gives it the slick finish that makes the roof tile more impervious to the passage of water and bonds the white surface to the basic tile thus producing a monolithic tile. This finish has been found to be highly resistant to the growth of fungus and passage of moisture. At the end of the production line, the tile are taken off the belt and placed in the racks, which in turn are picked up by Clark lift trucks and taken to storage rooms where, at the present time, they are stored without steam curing but are allowed to dry or to cure and dehydrate overnight. With the compression under the three rollers, the tile attains a strength over night sufficient to permit a person to stand on one of the curved barrel-type tiles the following day without causing fracture. However, 10 steam curing rooms are now in operation.

With the new curing rooms in operation, 'round the clock' operation is possible, and three or four types of tile can be made at one time. Reuse of equipment on a 5-hr. curing cycle will be attained, using regular portland cement with the steam at about 90 percent humidity and a temperature of about 130 deg. F.

At present, the tile are tested several hundred pounds in excess of building code and specification requirements. The specification is for 400-lb. strength. These tiles are consistently meeting 600-lb. strength. Water absorption specifications indicate about 10 percent absorption with an 11 percent individual maximum. Patent Tile Co.'s tile is running about 7 percent water absorption. A composite average of tests, conducted by two independent laboratories on barrel tile, show a crushing strength of 615 lb. per lineal foot and absorption of 7.3 percent, and on shingle tile show a modulus of rupture of 596 p.s.i. and absorption of 7.3 percent.

The storage yard has now about 50,000 sq. ft. of paved area with the capacity to expand over any or all of the 7½ acres now owned by Giffen Industries and leased by the Patent Tile Co. The inventory normally held in the stockpile in the yard is about 2000 squares of roof tile (a square being enough material to roof 100 sq. ft.). There are about 120 shingle tiles to a square and about 140 barrel tiles to the square. Some of the tile for local delivery is hauled on one of Patent Tile's two Ford hydraulic lift delivery trucks. The tile is crated, two squares to a crate, and loaded on hauling trucks with fork lift trucks. Three contract haulers also are used.

View of plant showing facilities, to the right, for handling aggregates and cement

Unit Masonry Association Idea Growing

• Started in Seattle, Wash., as a local association combining union labor, manufacturers of all types of masonry units, and contractors, the idea has spread to several other cities

By TIP BROWN

AN IDEA TO UNIFY all segments of the masonry industry originated in Seattle, Wash., a scant two years ago and resulted in the formation of the Unit Masonry Association. It has aroused so much interest over the country that the Seattle organization has been swamped with requests for details.

In the process of getting to work as an association, lions and lambs of the industry have lain together. Labor, management, and competing material firms have found that there is more substance where there are more lambs and fewer lions.

The Unit Masonry Association has told its story often through the building pages of the Seattle press. As an example, here is an extract of a newspaper advertisement welcoming the American Institute of Architects to their national convention in Seattle:

"Here, for the first time anywhere, as far as we know, is a group within the building industry that combines not only manufacturers, suppliers, and contractors, but labor as well. All these segments are working together, contributing both money and individual effort toward the development of a better understanding of the practical as well as design advantages of unit masonry . . . Already there are signs of interest in organizing similar groups elsewhere in the country. It is our hope and purpose that this movement, started here in Seattle, will develop and expand into a useful and helpful program everywhere."

Delving into the background of this unusual grouping of interests, it was discovered that two thirds of the local Bricklayers' Union in 1952 expressed a view that "customers in the masonry field were more important than hourly rates." Historically, a 10 percent increase had been approved by the Wage Stabilization Board in 1951 and had been accepted by the bricklayers. The following year, the Board revised the order and approved a flat rate of 15 cents per hour. The Union rejected the offer for the benefits that would accrue to the public and for the help it would give the Masonry Industry in meeting encroachments of competing wall materials. The newspapers made full use of this unusual news.

How Organization Functions

The action led to a coalition of contractors and the Union to engage in a publicity campaign. The manufacturers and suppliers of masonry units were invited to come in with them and the mortar, brick, concrete, glass block, stone, and scaffolding people responded whole-heartedly.

The organization was soon incorporated as a non-profit group and properly bi-lawed and constitutioned. The manufacturers and contractors alternate in the offices of president and vice-president. The business is conducted from the Union headquarters, and the Union secretary has served as the secretary-treasurer. A board of trustees of 14 members manages the association activities under committees assigned various activities. The financing is by a monthly contribution of 40 cents by each bricklayer and of $2 by each contractor monthly for each bricklayer he employs. This sum is matched on a pro rata basis by the members from the material groups.

Advertising

At the outset, an advertising agency was selected to develop plans and projects and present them to the advertising committee of the association. A commendable job has been done in keeping the Seattle area thoroughly informed on the merits of masonry construction, as well as to clear up any misconceptions about any part of the industry. Other committees promote harmony among members; gain public acceptance for the industry; conduct apprentice bricklayers contests; assemble masonry information for architects, engineers and the public; promote the use of membership decals on trucks, automobiles, and office windows; stage competitions among students and practicing architects; serve on building code committees.

Not the least of the many accomplishments has been to clear the atmosphere of erroneous propaganda relating to shortages of bricklayers, curtailment of units laid per day, and excessively high labor costs.

Home Show Exhibits

The Seattle Home Show has provided the excellent medium for meeting the public and telling the story of masonry by exhibits, apprentice bricklayer contests, and prizes to Pu-

Newspaper advertisement greeting to American Institute of Architects meeting in Seattle

get Sound architects for sketches, photographs, or designs of the best local masonry jobs. Two thousand dollars was distributed to successful contestants in the 1954 show which was held Feb. 6 to 14.

Apprentice bricklayer contests were staged at both the 1953 and 1954 Home Shows, along with exhibition booths with masonry materials displayed in attractive forms.

Full page ads in the building sections of the Seattle papers have directed attention to outstanding masonry jobs with illustrations of schools, residences, and commercial and industrial buildings.

The local press found the activities of the association a source of many columns of reading matter and of filling a perennial need from readers for building news.

Granting that well-planned advertising effort is of sufficient importance to warrant such an association, the idea back of this organization appears to go much deeper and to present the man-on-the-job in a new role. He has over night gained participation in the business from which he makes his living. He is spending some of his wages to perpetuate it. He has become an exponent of its products and services. He is paying a monthly premium toward job insurance and he will be inclined to place great store by his investment.

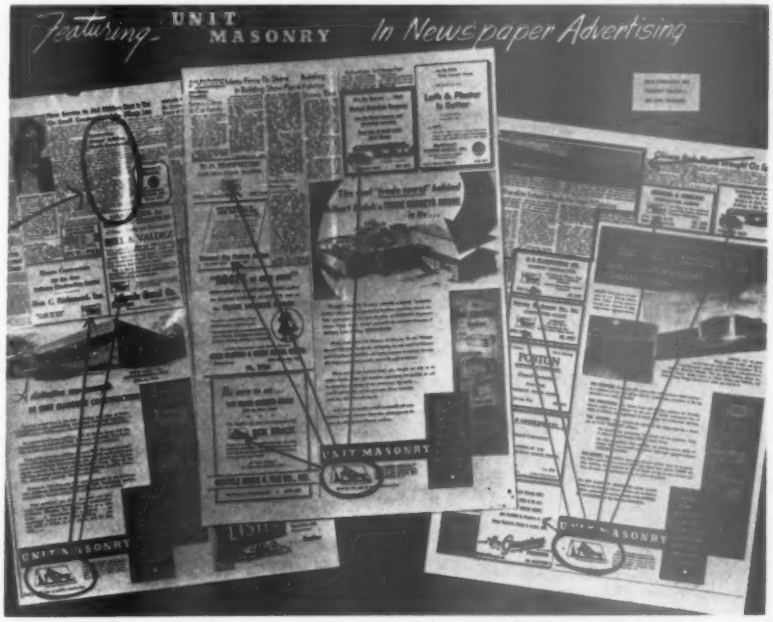
On the other hand, management always has been very kindly disposed toward the sales department as it is responsible for bringing in the dollars for running the whole show. There would seem to be no room for doubt that an additional sales force, armed with the potent selling tool of enlightened and enthusiastic workmanship and public service, will create a new and improved atmosphere at the conference table.

The masonry industry has a great opportunity to stretch its wings. With such backing, it can soar to new and undiscovered heights.

Purchases Firm

CAMP CONCRETE PRODUCTS CO., Fairfax, Ga., has purchased the plant and equipment of Muscogee Concrete Products, producing concrete block, foundation stone, and split block. A Besser block machine was installed, and a modernization program is underway which includes a new curing room. The company operates two plants at Fairfax, including the recently purchased one, and one at Albany, Ga. Frank Elliott, former president of Muscogee, is plant manager, Charlie Perry is plant superintendent, and Sidney McClure and Braxton Collins handle sales.

Views of Unit Masonry Association booth at 1953 and 1954 Seattle Home Shows. Crowds were attracted to the masonry apprentice contests



Three exhibits of newspaper display advertising by the association

A wide variety of concrete products are made in this plant, including concrete block, concrete pipe, burial vaults, cast stone trim, roof slabs and Mo-Sai architectural slabs

Celebrates 50th Anniversary

• Badger Concrete Co., Inc., Oshkosh, Wis., pioneer in industry and under one family ownership since it was founded in 1904, is in the forefront of new developments in concrete block, pipe, cast stone and architectural slabs

ONE OF THE MOST ENTERPRISING concrete products manufacturers in the business today, the Badger Concrete Co., Inc., Oshkosh, Wis., is celebrating its golden anniversary this year. In addition to the manufacture of Haydite, slag and sand and gravel concrete block, a wide variety of other products are made, including concrete burial vaults, cast stone trim, Mo-Sai architectural slabs, roof slabs and pipe. The company employs up to 40 persons in all its departments.

Concrete block are sold in a radius extending over 25 miles, but its specialty concrete products, such as Mo-Sai architectural slabs, have been shipped to such distant points as Kansas City and St. Joseph, Mo., Minneapolis, Minn., Niagara Falls, N. Y., and throughout Wisconsin and Upper Michigan.

The company was started in 1904 by Chris Olsen, a building contractor, who saw the possibilities in concrete block as a masonry material. Construction of burial vaults and cast stone trim began in 1907. The business was incorporated in 1921. Upon the death of the founder in 1931, his son, Edward Olsen, took over active management of the company as president and general manager.

During World War II, the company manufactured concrete practice "bombs" for the armed services and concrete shower trays for government housing projects.

Manufacture of Mo-Sai started in 1940 when the company was invited to join Mo-Sai Associates, a nationwide organization set up to promote and sell architectural concrete slabs under the Mo-Sai name. It is a thin precast, reinforced architectural concrete facing slab which derives its name from the mosaic characteristics of its exposed surface. Crushed and graded granites, quartz and other aggregates are used in its manufacture. The slabs weigh only 25 lb. per sq. ft., and are reinforced with heavy rod mesh, electrically welded and zinc-coated.

In the manufacture of concrete block, the company has kept pace with the latest developments, and is now using a Besser Super Vibrapac machine to obtain high production in meeting increasing demands.

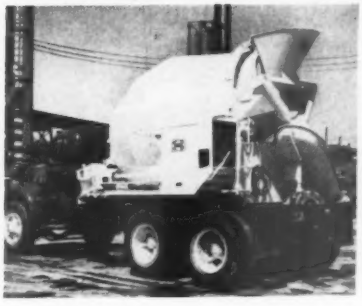
Specimens of all concrete products are periodically tested by the Marquette University testing laboratory to insure conformity to Wisconsin Industrial Commission requirements.

Edward Olsen, president and general manager of Badger Concrete Co., Inc., to the left, discussing a problem with Joe Mueller and Frank Olsen, son of the president. Samples of the company's products may be seen in the background

Permalite Sales Meeting

THE SECOND ANNUAL PERMALITE national sales conference was held June 28-30, 1954, at the Sheraton-Gibson Hotel, Cincinnati, Ohio, attended by representatives of the Great Lakes Carbon Corp., Perlite Division, and its marketing organization of over 20 Permalite franchises. Much discussion was centered on the steadily increasing use of Permalite as a concrete aggregate, and the potential offered with the growing trend to lightweight construction. Technological advances were also discussed, and plans for sales and advertising formulated. It was decided to continue the Committee on New Uses on a permanent basis under the leadership of W. R. Howell, following an encouraging report. Indoken Perlite Co., host to the conference, conducted a tour through its perlite processing plant at Cincinnati, Ohio.

NEW MACHINERY



Truck Mixers

BLAW-KNOX CO., Equipment Div., Pittsburgh 38, Penn., has added two units to its line of Hi-Boy truck mixers and agitators, the Model "M" in 4½- and 5½-cu. yd. capacities. The units are available with either an open or closed end drum, and with a water system to meet users' requirements. The closed end drum has a revolving hopper which can be rotated from charging to discharge position, or back, in three seconds, being held in either position by an automatic latch. The hopper has a 36-in. diameter, and a large diameter charging cone in the drum opening is designed to eliminate spilling during charging operations.

Wear-resistant Manten steel is used for the mixer shell and blades, with thicker plates in the front sections of the drum where the greatest wear occurs. The distributing spout is in two pieces, with a total length of 10 ft., the upper end being pivot-mounted, while the lower end is supported by an adjustable strut. The spout is bowl shaped at the upper end, eliminating sharp, hard-to-clean corners. The spout assembly can be swung to one side in a 90 deg. arc. for discharging into large concrete buckets or hoppers.

Extra-Axle Suspension

TRUCK EQUIPMENT CO., 1791 Fillmore Ave., Buffalo 14, N. Y., has brought out the "TandemTrac" extra-axle suspension system for trucks, tractors and trailers. Among its patented claims are automatic tracking, variable rate springs, automatic weight distribution, and "rocking-chair" bearing surfaces which eliminate the need for lubrication. The design of the unit's four radius rods is said to enable "tracking" around highway curves and aligning the axles on the straightaway. The three-stage spring leaves, enclosed in the fully welded suspension beams, are flat and do not have center-bolt holes or spring eyes, thus eliminating two sources of truck-spring breakage. The automatic load distribution feature, on trailing or pusher axle truck installations, is said to impose as much as 60 percent of the rear-axle loads on the driving axle when the truck is empty and automatically distributes the load evenly when the truck is loaded. On truck dual drive or trailer tandem installations this feature provides even weight distribution at all times. In all installations this distribution is fully automatic with no necessary adjustments by the operator.

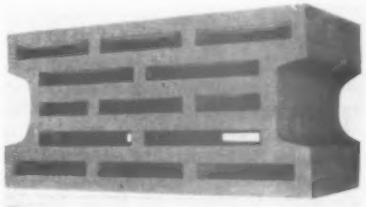
At the point of suspension contact with the chassis and with the axles, a rocking-chair type of bearing surface is used. These bearings, having virtually no sliding friction, receive little wear and are said to require no lubrication for the life of the unit. Another feature claimed for the unit is the elimination of wheel hop caused by severe braking. Weight of the suspension is slightly over 1000 lb.

Concrete Slump Indicator

IMPERIAL CONSTRUCTION EQUIPMENT CO., 230 W. North Ave., Northlake, Ill., has brought out the "Tel-A-Slump," a unit which measures the power requirement of the electric motor on a central mixer, and converts it into inches of slump, giving an immediate reading at all times in the mixing cycle. The unit is available in two models, an indicating model, and an indicating-recording model which provides a permanent record of the slump of each load that leaves the plant. A large diameter dial instrument permits reading the unit from a distance of 15 ft. if necessary, thereby allowing it to be mounted at the place of greatest convenience. Cases are dust-tight and moisture-resistant, and the unit is said to absorb a substantial overload (such as occurs when starting the motor) without adverse effects either from a mechanical or thermal standpoint.

Diamond Blade

ROBERT G. EVANS CO., 7204 Wyandotte St., Kansas City 14, Mo., has announced a Target wear-resistant diamond blade with a metal alloy bond for sawing lightweight aggregate concrete products, including Haydite, pumice and Waylite. The blade is said to be non-breakable and dust-free. The initial specification is a 14-in. No. 4 "Red" blade. The blades are individually packaged in a metal storage container for protection when not in use.



Concrete Block

AMERICAN WEBCO CORP., 501 Broad St., Sewickley, Penn., has announced a concrete building block which is said to have a sizeable increase in cells, over conventional block, thereby increasing compression strength by about 25 percent without adding additional weight or improving the mix. The block have six thin walls and no straight webs, thus causing moisture condensation to occur in the center area instead of the inner wall surface. An even disbursement of air spaces over the cross section is said to increase heat insulation by about 40 percent over conventional block, as well as retard sound transmission with this type unit.

The block is modular in size and approximately the same weight as conventional block. It is manufactured on plain-pallet block machines, and any practical aggregate which does not exceed ½-in. dia. may be used. A T-block is also available, which is reported to be one-third lighter in weight than those of standard size, and easier to handle due to the longer horizontal, or "T" area, being only 3⅝ in. thick. The vertical mortar joints are staggered to keep moisture out. The T-block uses the same mortar platforms as the standard size of this make.

Gilbert E. Olson, representing the United States, addressing the Congress in Brussels, Belgium. Mr. Olson was later elected president

International Precast Concrete Congress

• New techniques in manufacture, lightweight concrete, thin slab design, and the use of admixtures are topics of papers at Congress meetings in Brussels, Belgium

By GILBERT E. OLSON*

THE FIRST INTERNATIONAL CONGRESS OF PRECAST CONCRETE was held in Brussels, Belgium, June 20-27, 1954. The Congress was organized by the Chambre Syndicate des Belge des Agglomeres de Ciment with the cooperation of the European Productivity Agency, under the auspices of: Bond van Frabulcanten van Betouwaren in Nederland, Amsterdam; British Cast Concrete Federation, London; Bundesuerband der Betonsteinindustice, Bonn; Cement, Varufabrikernas Centralförbund, Stockholm; Fach-und Archeitgeberuerband der Baustaffindustue des Saarlandes—Saarbrucken; Federation Nationale des Fabricantes de Produits en Bentan, Paris; Landesforeningen Dansk Belowareindustri, Frederica; Norges Cement varefabrikkers Forbund, Oslo; Suomen Sementtituotelütto, Helsinki; Union Suisse des Fabricants de Prodients en Ciment, Berne.

Twenty countries were represented at this gathering with 235 delegates in attendance. The entire congress was well organized and nicely handled by the members of the Belgian Precast Concrete Industry. Besides a well planned program for the entertainment of the visitors, the Belgian members had planned a very interesting, instructive, and practical program delving into the field of precast concrete, its manifold uses and many of its problems.

Interpreters were always available so that group discussions could be enjoyed by everyone. There were two large beautiful lecture halls in the Palais de Egmont, completely outfitted with first class equipment for rapid interpretation and transmittal of all lectures and discussions. Each delegate had a very comfortable seat at a large conference table with ear phones and dials so that he could listen to any one of three official translated or direct languages used during the conference; namely, French, German and English. Each official principal speaker had sent his prepared paper or lecture to the Congress officials well in advance of the opening day of the Congress. Each lecture or paper therefore had been completely translated and printed before hand so that the various delegates could follow the sepaker's delivery of his lecture and at the same time hear it simultaneously through his ear phone set. Very fine arrangements had also been made for both movies and slide projections on a very large screen located behind the speakers on the speakers rostrum.

On Sunday, June 20, the Congress opened with a preliminary meeting of the heads of various delegations and their assistants in an assembly room in the Hotel Atlanta. Here final instructions and plans for the Congress were reviewed and ratified. This was followed by a cocktail hour and luncheon given by the Belgian Congress officials. In the evening at 5:00 p.m., the first inaugural assembly was held for all the delegates and the Congress was officially opened by Mr. Petit, president of the Congress.

New Techniques

Two complete auditoriums were available for the lectures and discussions. On Monday, June 21, a very interesting and descriptive lecture was given by G. Hansen of the Danish State Testing Laboratory at Copenhagen. Concrete and concrete products are carefully tested and valuable information is obtainable from this laboratory for use by the various manufacturers and contractors for their guidance in providing safe, sound and economical concrete structures.

Another paper was presented by R. L. Hermite, a very capable and well recognized engineer from the Laboratories du Batiment at des Travzuk Publics, Paris, France. In his lecture he pointed out that the shrinkage of hydraulic cements depends on the evaporation of a part of the water added during the mixing. That evaporation occurs according to a law anologous to the quantity of capillary water lacking with regard to the total capacity in capillary water (suction water). It is also proportional to the quantity of cement hydrated. Those properties can be explained by the special structure of the hydrated cement. The shrinkage of concrete depends on the shrinkage in the same hygrometry of the cement used in the mix design, on the water quantity, and on the granular aggregate composition. Shrinkage of concrete, of which

*Vice-president, Builders Supply Corp., Phoenix, Ariz., and recently elected president, International Federation of Pre-Cast Concrete.

the composition is known, can be computed by very close approximation. The fissure test with a ring has been chosen to compute swiftly the comparative danger which a cement may offer with regard to shrinkage and its consequences. For some cements, and in particularly severe hardening circumstances, the effects of shrinkage can be mitigated by using protective films.

J. F. Bradford of F. Bradford and Co., Ltd., London, gave a very interesting and colorful lecture on cast or reconstructed stone, including carving and sculpture. Many changes have taken place in the past years in the cast stone field, especially in the field of standards of quality and the methods used in manufacture of the products. By means of slides this evaluation was described and beautiful works of cast stone, employing both carving and sculpture were shown and explained.

R. Senouillet of the Polytechnic School at Marseilles, France, gave the delegates in attendance a lot of food for thought and experimentation. Since 1930, Mr. Senouillet has been very active in precast concrete, and has developed many fine, new techniques, including an electro-magnetic vibrating table especially intended to vibrate heavy units. He has developed a completely automatic molding machine for vibrated elements with immediate stripping. His research caused him to tackle the problems of shrinkage, especially of cellular concrete. He reviewed a number of international theories and treatments regarding creeping of concrete which, when properly applied, seem to stop the aftermath of shrinkage; namely, cracking. By the use of formulae and slides he pointed out that definite procedures can be set up to control shrinkage.

H. J. Walbeer, N. V. Schokbeton, Zeist and C. Verrugt, N. V. Nederlandse, Spanbeton Maatschappi, Alphen, a/d Rign, by means of slides and pictures, gave a very interesting report on prefabricated concrete construction in the Netherlands. Careful studies have been made to effect the most useful methods as well as the most economical procedures to use in casting and delivering precast buildings. Timing and well planned casting yards make possible very efficient low cost precast structures.

Inspection Trips

On June 22, the delegates were taken by special chartered buses to visit the beautiful concrete testing laboratory at the Ghent University in Ghent, Belgium. The next stop was made at the fabricating plant of N. V. Van Thuyne at Deinze, Belgium. Mr. Van Thuyne was a member of the Belgian Productivity Team that visited America in 1952, and many of the ideas he picked up in the United States at that time are incorporated in his rapidly expanding and successful plant. We next visited the plant of Victor Trief at Deaux-Aeren, and saw many new types of products and especially a plant to manufacture cement from blast furnace slag. This new patented process is gaining favor all over Europe and is shortly to be introduced into America by the Victor Trief concern. After lunch, the delegates visited the Chateau de Beloeil, an old castle in perfect state of repair.

Some of the delegates at the Van Thuyne Concrete Products plant, Deinze, Belgium

A second group visited Usines Dauchot, a large products plant located at Gasselies. This plant has two departments; one terra cotta, the other cast concrete. The plant turns out all kinds of cast concrete products for underground and road construction as well as precast units for homes and commercial buildings. The next stop was at Ciments d'Abourg, located at Olgourg near Mons. The process of cement manufacture was shown to the delegates including many late innovations. The plant is one of the most important on the continent, having seven rotary kilns, with the latest being one of the largest in the world. Using the wet process, this company produces ordinary portland cement, high-strength portland cement, and a rapid-hardening portland cement.

The ladies of the delegates were taken on special tours through the country, visiting various chateaus and other interesting sights in Belgium.

On Wednesday, June 23, the lectures were resumed at the Palais d'Egmont with a very interesting paper by G. Stellingweiff, an extraordinary doctor, engineer and professor of the art of building with concrete. Mr. Stellingwerff is connected with several cement companies and activities in Rome, Italy. His paper dealt especially with high-tensile concrete, the selection of aggregates, of cement in general, various curing methods and agglomerates. Precast concrete has been developed and used extensively, not only for homes, buildings, roads, etc., but also for railroads, especially prestressed railroad ties, and finally, special paving slabs with high abrasive resistance and also special paving stones of an interlocking type for use on runways for jet propelled aircraft, requiring especially durable concrete. It was interesting to note the tremendous use of precast products for so many special uses; such as, irrigation ditch liners, cisterns, poles and towers for electric overhead power lines, beams, lintels and stairs. Concrete products can be used economically and effectively in all types of construction and many unusual applications.

A. Jarrige, a mining engineer of real note in France gave a thought-provoking and very interesting report on developments of light concrete. He pointed out the economy of using natural aggregates, found locally if possible, and then transformed these natural aggregates into lightweight material for concrete. His paper with slides developed recent uses of mine refuse material into good lightweight aggregates and the further use of combustion dust as a pozzolana with cement.

Alfred Hummel of Berlin, Germany, the managing director of the Institute for Building Research, called attention to the many technical helps available to the trade which are so essential in making good concrete for almost any type of product.

R. LeLan of the Societe Francaise des Beton Leger at Paris, France, described the manufacture of high grade, lightweight concrete as manufactured in France. Mr. LeLan is also a consulting engineer with the Societe de Beton Gaz Lonain and the collieries of the coal mining industry of the Blanzy

(Continued on page 188)

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A. Amirikian of the Bureau of Yards and Docks, U. S. Navy, presenting his paper

coal field. After reviewing the history of lightweight concrete, Mr. LeLan gave a very complete working analogy of the various factors involved in the manufacture of lightweight concrete aggregates. He then brought out the economical features and advantages of lightweight concrete and the effect upon the national economy.

United States Developments

Arsham Amirikian, chief designing engineer in the Bureau of Yards and Docks of the United States Navy, gave a paper that opened the eyes of all those in attendance when they could see, by slides and designs, and hear Mr. Amirikian explain the technique of shell precast concrete. He showed the delegates some of the buildings erected which used concrete sections, having wall thicknesses of only 1 to 1½ in. He showed how large hangers and trusses were built and erected with this new type of precast construction that has gained such an important position in America. The main factors favoring precasting, Mr. Amirikian, pointed out, in lieu of conventionally poured-in-place construction, are elimination of costly form work, better utilization of high-priced labor and savings in time. Demonstrated economies and increased design applications have helped to enlarge both the volume of construction as well as the number of builders and constructors making initial use of the new technique. Mr. Amirikian clearly pointed out that structures may be built wholly or partly of precast members. The framing arrangements may be grouped under two main headings: (1) conventional, and (2) thin shell. The first type consists of members of solid cross sections and conventional shapes, while the second type of members have hollow cross sections and rib-stiffened, thin wall sections. Progress has been specially noteworthy in the latter category, where a number of important applications have been executed, mostly in U. S. Navy buildings and projects. Continued improvements in methods of casting, handling and erecting point to an interesting future for this type of precast construction.

By means of a 2000-ft. colored movie film and several hundred Kodachrome slides, the author, Gilbert E. Olson, of the Superlite Builders Supply Co., Phoenix, Ariz., gave the delegates a visual as well as verbal picture of some of the production techniques used in the American precast concrete industry. It was pointed out that the production of good, sound, well-cured, precision-made concrete products, having the proper modular size and shape, are absolutely necessary in order to gain favor among the builders, the public, as well as the architects. Productivity in American plants is geared to a system of mechanical devices designed to do a particular job efficiently, with the least possible man-power, he pointed out. Rapid handling of raw materials by rubber belt conveyors and elevators together with semi-automatic batchers, mixers and casting machines makes possible the low cost concrete products we have today. Then by providing well designed products, trucks, and material handling equipment, the newly made products may be easily dispatched to curing rooms, storage yards and finally to the job site. Considerable interest was displayed and many questions were asked him when moving pictures were shown of the Superlite semi-automatic block unloader which removes 180 8- x 8- x 16-in. block from any type of flat bed truck each time the operator moves the unit. Large flat bed truck with 12 cubes of block being unloaded in 20 min. were shown; also how block masons quickly and with apparently no effort lay up lightweight concrete block in the construction of 54,000 concrete block homes that have been built recently in and around Phoenix. Many of those in attendance had visited Phoenix as members of the Belgian Productivity Team when the mission was on a tour of the United States in September, 1952.

On Thursday, June 24, bus trips were taken to S. C. Pierrito at Ten Aard-Geel where the delegates were shown a very modern, up-to-date manufacturing plant making 11,000 sq. ft. of concrete tile and over 50 tons per day of numerous sizes of sidewalk slabs. Another group went to the tile factory of Jos. Hensen and Sons at Mol where the fine colored flambe and pattern cement tile and beautiful marble mosaic slabs were being made. This plant for 30 years has been featuring artistic concrete tile and mosaics. A visit was made to Usines A Claveaux des Charbonnages de Helchteren-Zolder, a block plant making special type of block at the coal mines for use in the mines as supports in underground work. Another trip was made to visit the C.B.R. Lixbe de la S.A. Cementeries et Briqueteries at Rennies. This modern cement plant was built in 1950, and is a result of careful planning and designing. It has become one of the most modern and efficient plants in Europe.

On Friday, June 25, the Congress heard a report presented by U. Kaiponen of the Suomen Sementtituotelutto from Helsinki, Finland. The report was prepared by K. Tammillieto, an engineer with the City of Helsinki. The report dealt with the precast products plants of Finland of which there are approximately 600 in operation. Finland is constantly improving operations, but there is room for much modernization of its concrete products plants through the use of material handling equipment, and especially better casting machines.

J. B. Baroin, a French engineer now in the European Technical Department of the Dewey and Almy Chemical Co., gave a very interesting report on the use of admixtures for obtaining air entrained concrete. The use of air entraining agents, he pointed out, should be directed toward savings by the reduction of cement used in the mixes, by more economical granulometry. Breakage may be held to a minimum at time of fabrication and also later when the products are handled at an early age.

B. Langton of Sweden presented an interesting review of concrete masonry in the Swedish building trade. There are approximately 900 concrete products plants in Sweden with 90 percent of these plants making block. The manufacture of block in Sweden is a very important branch of the construction industry. The value exceeds 100,000,000 Swedish crowns per year, and uses 1,663,000 tons of cement, which is 17 percent of the national output.

European Practices

With both movies and slides, a first hand glimpse was revealed of the concrete masonry industry of Sweden. Siporex, one of the leading lightweight concrete processes in the world, is employed in several very large block and slab plants in Sweden. The light, easy to handle, Siporex block provides a very strong lightweight wall with a

(Continued on page 197)

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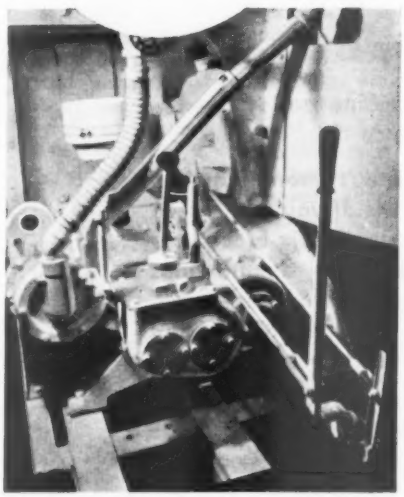

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LABOR Problems In the Ready-Mixed Concrete Industry

By JAS. A. NICHOLSON*

24: A producer views the ready-mixed concrete business

MAN'S THINKING ON LABOR UNIONS seems to go to the extremes. Many in management and the professions unquestionably feel that the unions constitute a harmful interference with the continued development of the free enterprise system. Some of these people believe that the unions should be completely abolished. These and other union critics are firmly of the conviction that a further expansion of union activities can only lead to communism or to an even worse state of affairs in this country. One management partisan puts it this way: "The union is an opposing force — a force that all of us face, many of us fear and some of us hate."

There are intelligent, loyal, God-fearing men who definitely place union activities on the credit side. These students of management-labor relations feel that labor unions, through constructive activities carried out on behalf of their members, have forced management, even in non-union shops, to better employer attitudes, improved working conditions, elimination of waste and inefficiencies, more stable employment and the development of effective routines and techniques. These defenders of labor unions point to great gains for the workers in protection against discrimination, arbitrary demotion or discharge, undue workloads, unfair layoffs, disregard of seniority and abuse of the right to air grievances without fear of reprisal. These men, who look upon most union activities with a kindly eye believe that labor organizations have made lasting, important contributions through their efforts in securing health and disability insurance, hospitalization and medical-care programs, pensions and other benefits.

Whether you as a ready-mixed concrete operator are yet willing to concede the point, it is by now fairly well established that unions have a fixed responsible place in the business structure. Undoubtedly, sooner or later, most of us will have to face the problems of dealing with union representatives and employing organized workers. Employees, enjoying benefits that they never dreamed possible of fulfillment, look back upon conditions as they were before the union came to the plant. In comparison with those days, workers see higher wages, steadier work, premium pay, vacations, paid holidays, hospitalization, social security, insurance, pensions and other gains. The passing events have given most of the cards to the unions. Continued good times aided by the support of a friendly national administration fully satisfy most workers that their unions have been highly effective in their behalf.

A false step in labor matters generally involves important money. Such a step might cause a strike. It could result in an unfortunate contract that would be binding upon your company for a long time. All labor matters require top-flight attention.

Employe relations are vitally important. It is essential that you sell yourself and the company to both employes and their union representatives. The operator with a good labor contract did a good selling job. Treat a union representative like you would a good customer. Union relations will improve immediately. Feuding with union representatives benefits no ready-mixed concrete producers.

Sometimes, through our own prejudiced opinions of any and all union organizers and representatives, we unnecessarily put ourselves to disadvantage in dealing with them. Many businessmen place all union leaders in the same category with hoodlums, racketeers and communists. Regardless of your opinions of union representatives, you are going to have to live with them.

A union representative tries to get into a lodge dominated by businessmen. In many cases, there are not enough "black balls" to go around. This same prejudiced feeling has inadvertently been a stumbling block in the path of better management-labor relations. That man may not get into the lodge, but at negotiation time, he may be a more capable representative of the workers than you are of the company that you represent. The labor leader knows the answers. Labor problems are his concern every day of the year. Management's job is to find representatives competent to face labor leaders on a more even basis in future dealings. The average businessman considers labor matters once a year — at contract time. On labor problems, the average businessman is no match for the competent union representative.

Regardless of one's opinions of labor unions, employers and employes have to work together to set up and maintain efficient ready-mixed concrete operations. Both management and labor must continue to face the hazards of cycles and depressions. Even with the inclusion of all the recently added social costs, producers still have to be able to profitably process and deliver a quality, low price concrete. Workers in our industry, even as they enjoy union-secured benefits, must still consider the possibility of curtailed employment, sickness, seasonal lay-offs, discharges and other interruptions of income.

The upsurge of unionism in recent years has created many problems which ready-mixed concrete operators, together with all businessmen, are forced to face. Wages have skyrocketed in all occupations. In many operations, the quality of work has deteriorated. Hours of labor have been restricted and overtime work paid for on a premium basis. Insurance and welfare plans have been forced to acceptance. Payment for holidays is an evergrowing twist. Everywhere, fringe benefits are on the march. A guaranteed annual wage is being increasingly sought.

The upsurge of unionism in many other ways, has also affected relations that formerly existed between management and labor. In the over all, the authority of management has been lessened; the rights of the workers have been increased. In matters concerning the rights of workers, management no longer has a free arbitrary hand.

The coming of the union to a ready-mixed concrete plant means certain facing of new conditions, obligations and demands. While facing these new problems, all of which add up to greatly increased costs, the operator must continue to be able to make profitable sales of his product at a price contractors are willing to pay.

No producer can "buy" all the labor proposals (which have been advanced) and continue to operate profitably. A

*Pres., Nicholson Concrete Co., Toledo, Ohio

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study of the nature of our business offers a partial answer as to which proposals we can and should accept. We are forced to pay for a lot of non-productive work in equipment preparation, downtime, accidents, plant pile-ups, noon hour, slack periods, washing-out, job hold-ups etc. In a year's time, to keep a crew together, we rather frequently "make work" for our men. Our work is seasonal with periodic "ups" and "downs." The number of profitable operating days is limited by uncertain weather factors. Most operators face the burden of carrying men through a winter period. Some producers are forced to have extra men on the payroll even while enduring three or four months of constant loss. Even in good building months, the daily amount of business and work available is largely dependent on the morning's weather.

Practically all producers running a union plant have gone to a 40-hr. week, to which is generally attached an 8-hr. day. Because weather conditions interfere with work continuance, 2 to 4 hr. "call-in" pay has been widely accepted. "Call in" pay is supported by the contention that when a man is ordered to leave home for work, some expense is involved and the family of the employe has the right to expect him to receive some compensation for his reporting efforts. Most producers are giving vacations. Many are furnishing uniforms.

Both employes and employers should face the fact that production of ready-mixed concrete is a seasonal business. Producers are burdened with "making work" for employes, providing "call in" pay, paying unproductive labor costs and accepting a lot of overtime, some of it unnecessary. When business is good, the presence of a sufficient number of workers is of vital importance. The downtime of a truck mixer, because of the absence of its driver, ruins service and sharply reduces daily profits. No union should expect an extra week of vacation during the regular building season. Because our business is highly seasonal, we are necessarily burdened with many great labor cost drains on our profits. We are on firm ground when we aggressively resist paid holidays, welfare plans and other fringe benefits.

There is one matter which can get us into serious trouble. It is our close association with the construction industry and the building trades. The pressure is always on us to pay building trades wage rates. Some producers have foolishly agreed to pay a comparable rate to a crane operator because only one employe was involved. The drive is on. The Teamster's Union quickly points out the great differences in hourly rates and demands corresponding increases for their men. The only sane policy is to resist this comparative rate pressure.

Management and labor should always attempt to understand the point of view of the other side. On all matters, both should do their level best to reach accord on the basis of justice and fair play. Management, in its actions, must prove to its employes that i relations with them, management wants sincerely to be fair and considerate. Labor, while seeking better pay and improved working conditions should respect and carry-out management's direction. For our country's best interests, management and labor must learn to live together.

The Labor Contract

A labor contract is a business deal. In hard words, it is an agreement to buy some kind of labor for a certain amount of money for a given length of time. A good labor agreement provides rules and regulations covering management-labor relations; sets forth rights, responsibilities and duties of employers, unions and the individual employes; guarantees fixed wages, certain employe benefits and satisfactory working conditions; and finally, permits sufficient leeway for a producer to operate efficiently and profitably.

(Continued on page 194)

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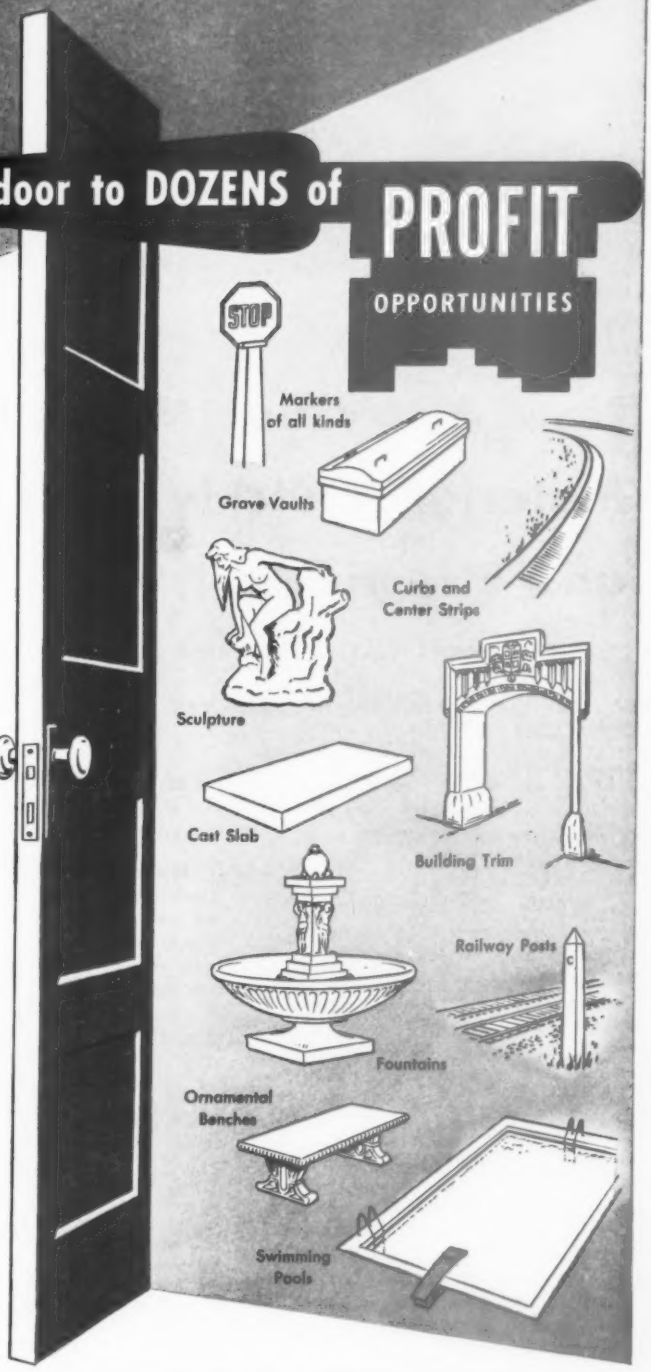

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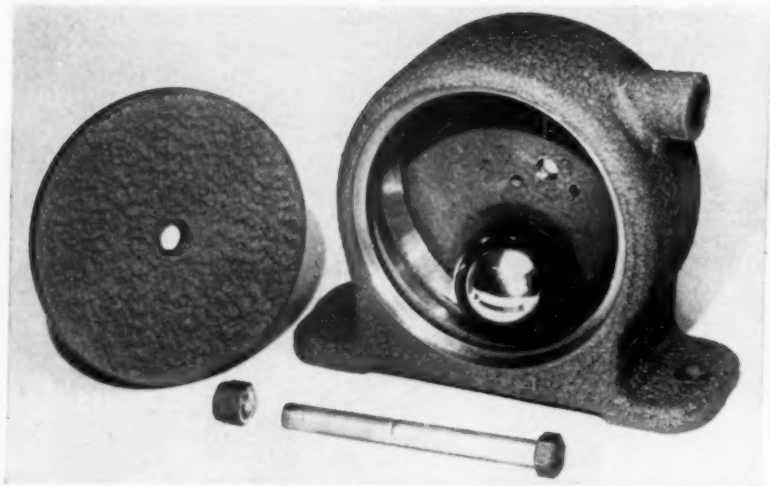

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The AiroViber is able to deliver effective and dependable vibration with only one moving part, a heavy steel ball running on a circular track. The pounding usually associated with ordinary types of vibration has been eliminated with the special noise lessening design, exclusive with AiroViber.

Simplified Design

AiroViber's one moving part is a steel ball. An air jet blows it at high speed around a ground and hardened steel track in the housing. The weight of the ball develops a strong centrifugal force, which the vibrator transmits through its mounting into the object to be vibrated. It will start and operate under any condition and performs at high or low temperatures. AiroViber is not affected by humidity.

Trouble-Free Operation

The AiroViber is almost fool proof in operation. Because it has no close fitting parts to lubricate or adjust, it will start every time you open the air valve. You can install it in hard to get at locations with full confidence that it will operate without lubrication or maintenance for a long time.

No Installation Problems

AiroViber is easy to install. It does not need any special line oilers or air filters. Merely hook up an air hose large enough to deliver the air specified for the unit you select.

AiroViber rotary vibration breaks up arching and jamming in bins, hoppers, chutes, feeders, and other places where bulk materials hang up. It is also recommended for vibrating tables or platforms, sorting and many other applications.

AiroViber is a product of Viber Company, leader in the field of vibration. For further information, write: Viber Company, Dept. PR 71, 726 South Flower St., Burbank, Calif.

VIBER CO.

CONCRETE VIBRATORS SINCE 1931

In the preparation of a labor agreement, insist upon a complete coverage of management's rights. Our small companies need all the protection they can get. Demand that the management clause be given a prominent place in the contract. When a good "management rights" statement is prepared, key men know the extent of their authority and workers are less likely to question reasonable orders. Spell out employer's rights so that workers will not be continually challenging management's authority. The contract should give management required controls over operations including full direction of the work force. The contract should give the producer the tools to maintain discipline and efficiency. The contract should give the operator the right to discharge on showing just causes. The contract should list just causes.

Other than for the purpose of discrimination against the union, management should have exclusive authority over the working force on such matters as hiring, directing, promoting, demoting or transferring employes. It is the company's prerogative to place the most competent man on the available job. The company also has the right to order a worker to perform any reasonable work which is available. When fair and reasonable orders are issued, workers should realize that management's authority to direct is to be respected and followed.

In our industry, management has the right to keep drivers on the same trucks, to change men to different trucks or to assign plant men and drivers to different plants. A man who has been a good dump-truck driver might be a "bust" on a truck mixer. The company has the authority to replace him with a more competent man. No union should object to the right of management to demote an employe to a job fitting his capabilities. The welfare of the entire organization is dependent on the efficiency of the operation. Unions have no right to interfere with efficient operations and capable direction of the work force. The labor contract should contain clauses and statements protecting the employer's interest on these points:

1. Management is the boss; labor agrees to promptly carry out all reasonable orders.
2. Recognition of no employe rights in conflict with decent, efficient operations.
3. Authority to hire and promote on ability.
4. Right to discharge on showing just cause.
5. Wage rates and employe benefits in line with competitors.
6. Wage rates comparable to those existing in similar occupations.
7. Wage adjustments to be made on

ONE-MACHINE BLOCK-PLANT

ONE Columbia 12" HIGH MAKES

WATER METER BOXES • DRAIN TILE • SILO STAVES • FLUE LINERS • PARTITION BLOCKS AND OTHER SPECIAL SHAPES

The Columbia 12"-High—on standard plain pallets and in its regular fast cycle—makes all the special shapes listed above... and many others! Some of these shapes have never before been produced on a standard block machine. NOW, with Columbia, block makers can enter these highly profitable fields... with a rugged, tested machine that gives automatic high production. Available in two-block and three-block sizes.

PLUS ALL STANDARD BLOCKS IN 4"-8"-12" HEIGHTS

With a quick mold change, Columbia 12"-High can produce any of the more than 250 standard blocks made by its sisters, the Model 8 and Model 12. That's why we call the 12"-High ..."the One-Machine Block Plant"!

District Offices in: Wisconsin, Ohio, South Carolina, Mississippi, Florida, New Jersey, Virginia, California and Massachusetts.

Columbia MACHINE
Home Office: 107 S. GRAND, VANCOUVER, WASHINGTON
Factory Branch and Warehouse at Mukwanago, Wisconsin

WRITE TODAY!
for folder giving complete information on Columbia 12"-High

HOWEVER MODERN...YOUR PLANT IS NOT COMPLETE WITHOUT THIS KENT LINTELATOR!

Sounds like a challenging statement, doesn't it? But it is a fact that can be substantiated.

Every block producer is interested in getting all the business he can legitimately and at a profit.

Why then should he not be producing and selling concrete lintels and sills?

We have the facts to prove that they are being widely accepted by builders and that there is a growing, profitable market for them.

We will be glad to send you the LINTELATOR LITERATURE and submit the evidence to you. *Ask for it without entailing any obligation.*

The KENT MACHINE COMPANY

CUYAHOGA FALLS, OHIO

CONCRETE PRODUCTS MACHINERY SINCE 1925

Canadian Distributor: Wettlaufer Equipment, Ltd., 49 Merton St., Toronto 12, Ontario

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THE

Recognized Authority

OF THE

Non-Metallic

Minerals Industry

a basis that will lead to improved relations.

Similarly, the contract should contain provisions satisfactorily protecting the union's and employe's interests:

1. Acknowledgement of union as representative of the covered employes.
2. Acceptance of established union rights and prerogatives.
3. Coverage of contract definitely agreed upon.
4. Protection of competent employes.
5. Wage scales, benefits and working conditions comparable to similar occupations.
6. Procedures for proper handling of grievance matters.
7. Adequate consideration for reinstated men.

Unless a labor contract specifically states otherwise, the union is sovereign on matters over which it has had traditional exclusive control, not involving operation of the business or direction of the work force. Unions insist upon such rights and prerogatives. To maintain their position, they rely upon past practices and determination. These matters include membership standing, seniority determination, payment of dues, voluntary check-off agreement on the employe's part, loss of jurisdiction over jobs, bulletin board privileges, selection of plant steward and union representation. Unless otherwise provided, union rights on such matters are paramount.

On a problem involving seniority, you can count on the union being most aggressive. The seniority problem could be a question of lay-off. There could be an advancement, open to employes of equal ability and uncertainty as to whom has the greater seniority. In either case, unless the contract covers the problem, the union's judgement prevails on seniority determination.

It is the mutual concern of both the ready-mixed concrete producer and the union that the labor agreement be worked out by them with no outside help. The most satisfactory contracts are those negotiated directly by the concerned parties without outside resistance or interference. It is also of mutual interest that labor contracts contain satisfactory provisions for grievances and arbitration.

A labor contract in the ready-mixed concrete industry should recognize the fact that the employing organization offers services and work with the amount of both largely determined by uncertain weather factors. The contract should take into consideration the problems of delivering ready-mixed concrete in unusually expensive, single purpose hauling units; load limit restrictions (small legal payloads), high delivery costs, the possibilities of

breakdowns and accidents (costly in regard to both repairs and interference with service), the importance of meeting delivery schedules, the perishable nature of our product and the danger of pricing the producer out of competition.

A contract should recognize the importance of employe's capabilities in the handling of expensive equipment, operation of heavy dangerous trucks, controlling quality of the concrete and satisfactorily servicing customers. Attention should be given to conditions involving seasonal work, bad weather coupled with the possibility of sharply reduced weekly checks, change of vacation periods to prevent interference with peak business opportunities, and the requirement of long hours during the active building season.

The most important labor agreement that a company will ever sign is the original union contract. Full, complete preparation is absolutely essential.

Unfortunately, many representatives of ready-mixed concrete companies go to the meetings, at which the original union contracts are to be drawn up, completely unprepared for their important assignment. Member companies, faced with the ordeal of preparing initial union contracts can get, for the asking, much valuable information from the National Ready Mixed Concrete Association. In addition, these producers should engage the services of a competent labor counselor.

(To be continued)

International Congress

(Continued from page 188)

high insulating factor. The Swedish Concrete Association has done a remarkable job in making possible the high standards of manufacture that are a requisite for any construction in Sweden. Research by both the cement companies, as well as the private products manufacturers, has placed Sweden well out in front in all phases of precast concrete.

C. Joly, a civil engineer with a broad experience in France and Belgium and a Director of the Chambre Syndicate des Agglomeres de Ciment, gave all the Congress some interesting and startling remarks in his paper on the promotion of the concrete products industry. He criticized the present standard portland cement as being too much of a universal binding agent. More specialized cements for use in various types of concrete products are needed, he pointed out. The need for more specilization in the cement field is not a new development, but has been recognized for over 20 years. Cement products can be improved and a lot of failures avoided if only a better gradation in "binders" is obtain-

no better mixer at ANY price!

The new ROCKET

Yet costs less...

FEATURE FOR FEATURE, YOUR BEST BUY!

HYDRAULIC CHUTE CONTROL eliminates man-handling. Controls grouped for easy access. NO EXTRA COST!

ALUMINUM CHUTE cuts weight two-thirds! Easy to handle. Extra extension gives new longer length.

REVOLUTION COUNTER built in, so you can handle any specifications with the Rocket!

SPECIAL ALLOY, abrasion resisting steel used at all wear points.

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THREE-POINT SUSPENSION, one-piece cast steel precision machined ring.

...far less than other comparable high-quality truck mixers!

Frankly, there are a lot of good truck mixers on the market today. The Rocket is one of them. We're not claiming that the Rocket is by far the best, but it's a *fact* that you can't buy a *better* truck mixer—anywhere!

You'll be pleasantly surprised to learn that the Rocket actually sells for many hundreds of dollars *less* than most truck mixers of comparable dependability, ruggedness. And it's economical—good for many years of trouble-free operation.

The reason you save substantially is that the Rocket is sold *directly to you.* There are no middle-men. What would be your distributor's profit is passed along to you in the form of savings.

If you are efficiency-wise and economy-minded, but insist upon the best equipment money can buy, then the new Rocket is the answer for you. Send the coupon *today!*

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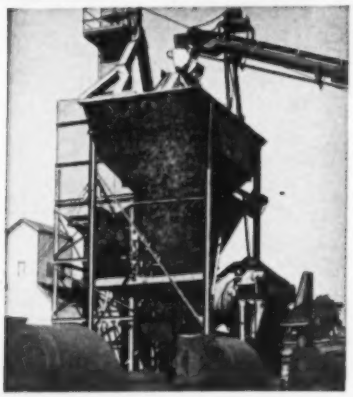

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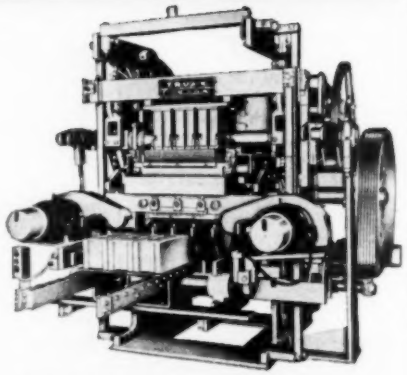

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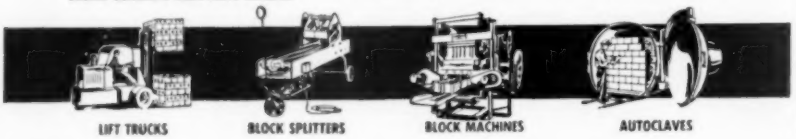

LIFT TRUCKS | BLOCK SPLITTERS | BLOCK MACHINES | AUTOCLAVES

ed. Research is going on in many parts of the world and eventually changes will be coming forward.

E. Marquardt of Stuttgart, Germany, brought to the Congress a very interesting and helpful report based on years of practical experience with public utilities in the use of concrete underground pipe, their supports, connections, sealing of the pipe, and the proper execution of drainage or pipe contracts. Very often the concrete products manufacturers are also the contractors at the point of use of the material.

On Friday, June 25, a general meeting of the entire Congress was held to adopt resolutions and findings. It was agreed to continue the work started by this, the first International Congress, and hold the second Congress in 1957 somewhere in Germany, subject to the advice of the heads of the various federations represented. The expressions of appreciation, voiced by many of the members in attendance who were speaking for their delegations, proved, without a doubt, the need for such a meeting or Congress so that a universal exchange of good sound basic ideas and practice can be carried on to make precast concrete, the universally accepted product for construction, especially in the building of homes and commercial buildings. Gilbert Olson, of Phoenix, Ariz., was elected president of the committee to head up the second Congress of precast concrete and call the necessary meetings and develop, in cooperation with the Chambre Syndicale of the Belgian Precast Concrete Manufacturers, the program for the next three-year period. Steps have been taken to set up the necessary operations and, with the assistance of the Foreign Operations Administration in Washington, D. C., the next three-year period should see the work of this first Congress develop into a medium of great value in all parts of the world to help concrete products manufacturers provide the finest, and most up to date products and practices.

On Friday night, June 25, a banquet was given by the Chambre Syndical des Agglomeres de Ciment for all the delegates to the Congress and their wives in the big banquet hall of the Palais d'Egmont with music furnished by the Roval Symphony Orchestra of Brussels, Belgium. Each lecturer of the Congress was presented with a certificate of the Congress and a beautiful book of "Belgium." Recognition should be given to the administrator and director at large of the entire Congress, R. Delobelle and to his wife who so graciously attended to the entertainment provided for the wives of the visiting delegates. To Mr. Festraets, the secretary-general and a di-

rector of C.S.A., who did a tremendous job of organizing the Congress, taking care of the details, the planning and execution of the necessary work together with Mr. Duval, who is Chief of Services of the Foreign Operations Administration European missions. To Mr. Desomer, a very active and progressive manufacturer in Belgium as well as in the Belgian Congo, who was an inspiration for all those who had the pleasure of being with him and learning of his work as president of the local Chambre of Precast Concrete of Belgium. To Mr. Crabeels, an administrator and director of the Chamber, who has for several years worked hard to get this program of international understanding and cooperation into effect and reality. To all the ministers of the federal governments of Belgium and the local offices and societies of the City of Brussels who helped in so many ways to make this Congress a huge success.

Our American government can well be proud of the results of several years of planning, active programming and careful execution of the American plan to help Europe raise its standards of living.

By sharing with the various business leaders of Europe our ideas of productivity, our ideas of labor relations, our ideas of business management we have, through the Foreign Operations Administration at Washington, D. C., accomplished a major goal in world politics and unification.

The First International Congress of Precast Concrete closed on Saturday, June 26, with a tour through several plants in Belgium. The Westvlaamsche Betonwerkery N.V. at Brugge is a large, modern products plant employing 150 men specializing in concrete block and brick and all types of precast floors; hollow, ribbed, pumice; concrete roofing, slabs, septic tanks and many other utility type concrete products. The H. DeClercq-De Maeschalk N.V. plant at St-Kruis near Brugge is an old but modern plant established in 1898 which specializes in all types of concrete products and floor slabs. This plant is highly mechanized with two traveling overhead monorail cranes and four bridge cranes handling the various casting operations and material handling operations. Also at Brugge is the very modern up-to-date plant of N.V. Structo, specializing in prestressed concrete using the Hoyer process. This plant, which has four acres under roof, has casting beds up to 164 yd. long. Every known modern method is employed here to manufacture, on a production basis, all types of beams, columns, girders and slabs. After the tour of the above plants, the group assembled for a final farewell supper at the Casino Kursaal at Ostend, Belgium, which overlooks the English Channel and is built right on the ocean front.

It can be truly said that the closing of this Congress sent the various delegates home to their respective countries with a better understanding of their industry and note books full of real ideas to further the use of precast concrete on a larger, more economical and more practical scale. The friendships and understanding of the delegates from the different countries will do great things in building world peace and unity.

New Ready-Mix Plant

CROFT CONSTRUCTION CO., Fort Dodge, Iowa, has opened a ready-mixed concrete plant on property owned by Duane L. Croft, president, following withdrawal of a petition for erection of the plant at another site to which local residents objected.

Steam Curing Study

THE NATIONAL CONCRETE MASONRY ASSOCIATION reports the results of a recent study of the effect of steam curing at atmospheric pressure on the compressive strength of concrete masonry units.

USE Trinity White

the whitest white Portland cement

. . . for the utmost beauty in architectural concrete units . . . terrazzo . . . stucco . . . light-reflective uses . . . and better color jobs.

Use Trinity White Cement when you want the permanence and workability of a portland cement plus the remarkable beauty of a brilliant white. So when you're asked for something that is better than the ordinary—you'll find that making it of Trinity White Cement is a most constructive suggestion. It's a true portland and meets all Federal and ASTM specifications. For descriptive literature, write Trinity White, 111 W. Monroe St., Chicago.

A Product of GENERAL PORTLAND CEMENT CO. • Chicago • Dallas • Chattanooga • Tampa • Los Angeles

Blaw-Knox Quick Opening Doors speed production of concrete blocks at National Brick and Supply Company

At Terra Cotta, in Washington, D.C., National Brick and Supply Co. operates one of the most modern concrete block plants in the country.

Eight 120 foot pressure curing chambers are loaded with palletized concrete blocks by fork lift trucks. Blaw-Knox Quick Opening Doors, built for 150 pound operating pressures, are closed and locked securely by a simple, rim-locking mechanism in seconds. These modern curing and handling techniques, plus Blaw-Knox Quick Opening Doors, enable National Brick to maintain volume production with minimum operating cycles.

Blaw-Knox Quick Opening Doors swing freely on ball bearing davit hinges. They are completely free of bolts, lugs, levers or sliding bars. Easily replaced, self-sealing gaskets are positively sealed by internal pressure.

Blaw-Knox Quick Opening Doors are built for manual or mechanical operation on horizontal or vertical vessels.

Write for Blaw-Knox Booklet No. 2435.

BLAW-KNOX COMPANY *Blaw-Knox Equipment Division*
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6 Reasons for Using JLS FAST WETTING YELLOW OXIDES

1. Give higher gloss enamels
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Simplest, surest way to get consistently better ready-mix batches is *accurately metered* water . . . with a dependable, long life Neptune water meter. Easy to read, saves space, speeds loading, and reduces structural requirements. Your choice of two types: Auto-Stop meter which automatically shuts off the water at exactly the right amount, or manually controlled round-dial meter. Write today for full details.

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Make this your BEST year with the BES-STONE Block Splitter

Front view showing operator feeding block into BES-STONE Block Splitter.

Expand Your Opportunities — Cash in on the Split Block demand. Its "quarried stone" character pleases owners. You'll find it ideal for all structures, large or small . . . commercial, institutional or home construction. BES-STONE challenges the creative ability of both architects and builders.

Splitters in 18" and 24" sizes — Automatic, powerful, hydraulic operation . . . up to 960 Split Block per hour. Straight line cuts . . . No cull block. Easily adjustable for splitting various block heights. Block is placed under knife, automatically. And the finished Split Block is automatically removed from under the splitting knife by the incoming block. Quiet, safe operation.

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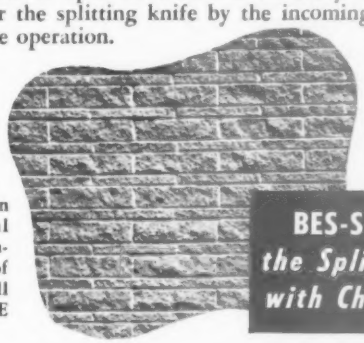
Profitable Producer of 960 Split Block per Hour!

There's big money for you in attractive, permanently colorful BES-STONE Split Block. It complements and increases sales of standard stripper block. Get all the facts. Write for BES-STONE Bulletins 95A and 100.


Note the natural beauty of BES-STONE. No maintenance, no painting, no peeling off.

BES-STONE *the Split Block with Character*

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PAY FOR GERLINGER IN LESS THAN ONE YEAR!

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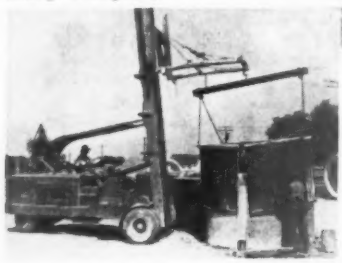
The Concrete Pipe Company of Ohio, Inc., has had the economies of Gerlinger mechanical handling soundly . . . and profitably . . . proved. Previously, the firm was forced to rent a portable crane which required three men full time to operate and service. Today, a Gerlinger fork lift truck (1) does the work of the rented crane, (2) transports pipe in yard and drying kilns, and (3) loads trucks . . . *all a ONE-man operation!* Now, three Gerlingers are kept busy at the North Randall, Ohio, and Erie, Pa., plants.

For specific data to fit your particular operation, see your Gerlinger dealer or drop a postal to the Gerlinger Carrier Company, Dallas, Oregon, now. A request will bring you the new fork lift truck catalog. No obligation.



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Lifting heights from 10' up to 18'

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6 long wheelbase (130") models
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Lifting heights from 10' up to 24'

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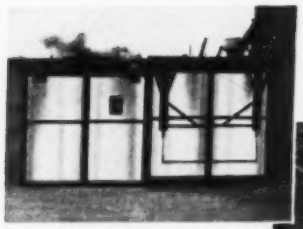
CUT COSTS • UP PROFITS
with *Standard* KILN DOORS!



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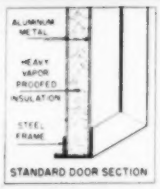
WHERE HINGE-TYPE DOORS ARE PREFERRED Choose from two STANDARD hinge-type doors. The top-hinging door (shown) can be used when there's insufficient room at sides of door. The conventional side-hinging door has rugged hinges and positive-seal lock.

CHECK THESE FEATURES

- Heavy Aluminum Sheets on Both Sides of Thick Vapor Proofed Insulation.
- Rugged Steel Frame.



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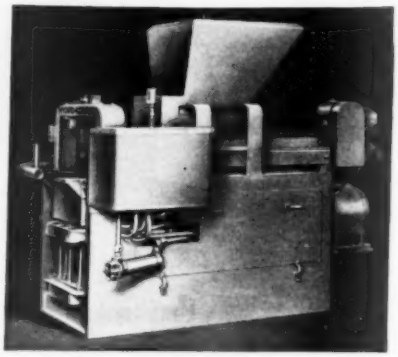

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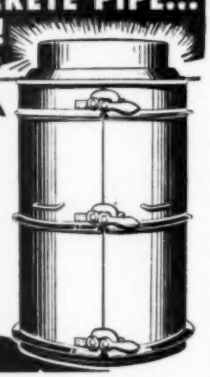

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For making pipe by hand methods by either the wet or semi-dry process. Sizes for pipe from 10" to 120" and larger. Tongue and groove or bell end pipe in any length desired.

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- **Dur-O-wal Division** Frontier Manufacturing Company Phoenix, Arizona
- **Dur-O-wal Products of Alabama, Inc.** P. O. Box 5446 Birmingham 7, Alabama

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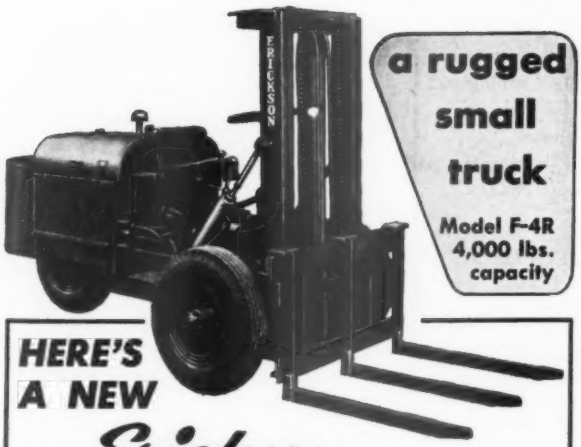
THE RECOGNIZED AUTHORITY OF THE NON-METALLIC MINERALS INDUSTRY



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Model F-4R
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For tricky ramps, rough or soft ground, cramped quarters—you will quickly become a booster for Erickson F-4R ease of handling, traction, balance, ruggedness. Comfortable seating space reduces operator fatigue. The F-4R is designed for more work per day—built for lower cost per year. Erickson quality is economy for you! Forks, mast and lift heights as ordered, twin tilt cylinders, 4 speeds forward, 4 speeds reverse. Side-shifter, scoop and other attachments available.

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(Filler for Floors and Roofs)

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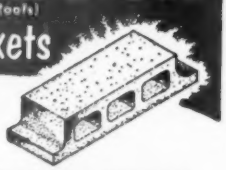

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Gives FLOORS and ROOFS Lifetime Permanence . . . Cuts Construction Costs!

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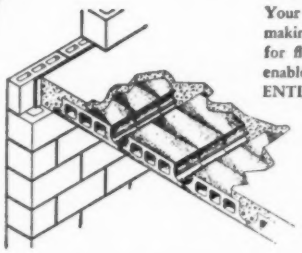

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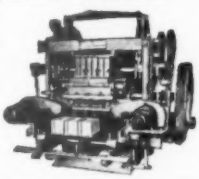
Soffit Filler Block are made on the same machine that produces quality concrete load-bearing block for walls, in all styles and sizes, using one set of Plain Pallets. Write for literature and names of Vibrapac plants making Soffit Block.



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ALPENA, MICHIGAN, U. S. A.
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For Batching—
A RICHARDSON AUTOMATIC PROPORTIONING SYSTEM
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Excellent Condition.

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Joltcretes—Quincy, Ill. and Two Harbors, Minn.

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CEMENT COLORS
MORTAR COLORS
made by
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COLOR YOUR CONCRETE!
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- ___Admixtures, Aggregate
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- ___Agitators*
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- ___Air Compressors
- ___Air Separators
- ___Asphalt Mixing Plants
- ___Bagging Machines
- ___Bags*
- ___Barges
- ___Batchers
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- ___Bits*
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- ___Bodies, Trailer*
- ___Brick Machines and Molds
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- ___Central Mixing Plants
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Both for $2000.00

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Modern Ready-Mix Concrete Plant

Located in city of 15,000. 6 small towns in 20 mile aren. No competition within a 55 mile radius. Major mining company accounts. Large school building program in progress. Volume of business increasing yearly. BOX M-62, CONCRETE PRODUCTS, 309 W. Jaskson Blvd., Chicago 6, Ill.

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1600 Various Size Pallets for above.
1—Good Appley One Block Vibrator, Extra Cores and Parts.
4—10' Pieces Roller Conveyor.
Also 4800 6", 8", 12" Steel Pallets, Pressed.
Priced for Quick Sale—All or Part.

MARION BLOCK CO. Cynthiana, Ky.

SALESMAN WANTED

To sell our famous Formula No. 640 colorless masonry sealer, silicone water repellent, concrete hardener, floor mastic, admix for topping floors always cold and wet, curing compound, rubber enamel, roof coatings, gilsonite paints, floor wax containing duPont's Ludox. Thirty products. Contact building owners and managers, contractors, etc. Commission. Territory. Name this magazine. Write **Haynes Products Co., 4007 Farnam St., Omaha 3, Nebr.**

A GOOD BUY . . . COMPLETE BLOCK PLANT EQUIPMENT

1 George Machine # 400 (automatic) with off-bearer, Compressor, automatic pallet feeder, pallet tank, etc., complete.
2 George Machines # 100 complete.
2 Conveyors.
2 Mixers.
1 Car Unloader.
1 Tractor with Bucket Loader.
1 Hyster Fork Lift.
1 Truckman lift truck.
1 Pallet Hand Truck.
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110 Steel Racks.
7500 Alum. Pallets.

Note: Most of this equipment is less than 4 years old. All in good condition—in daily use.
TOTAL price $29,250 Located in Florida
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KEEP ABREAST
WITH
INDUSTRY TRENDS
THROUGH
ROCK PRODUCTS

BLOCK PLANT FOR SALE

Well established wholesale block plant located in the Great Lakes Region. Price to include Land, Buildings, Equipment and Inventory. Price to be based on a market with unlimited possibilities. Terms of sale and other details on request. Reason for sale: Owner has other interests.

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UNBREAKABLE
PALLET RINGS
Write for full information
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LUFKIN, TEXAS

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Concrete products business including septic tanks, concrete drain tile, precast concrete steps, national advertised line of out-door barbeques, incinerators and other concrete specialties. This is a going business with much room for expansion. All molds and machinery included.

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1—Model 9 Joltcrete complete with Power Offbearer. 4", 8", 12" Attachments.
7 3/8"—50% Cast and Aluminum Pallets.
3 3/4"—(B20) Cast Pallets.
11 3/4"—58% (B17) Cast Pallets.
1—84" Turntable.

Equipment in very good condition. Any of above items can be purchased separately.

IONIA CONCRETE PRODUCTS, INC.
Ionia, Michigan

FOR SALE

Van-U-Matic 2 block plain pallet air operated block machine, off-bearer, 15 H.P. air compressor, 1,050—3/16" x 18" x 18" steel pallets, 4x8x16, 6x8x16, 8x8x16, 12x8x16, with attachments solids, corners and sash block, 15 cu. ft. mixer and conveyor. This machine is in very good condition and may be seen operating until the new Columbia has been installed.

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Good Kor-Pak Block Machine, complete with mold box and 2,000 pallets for only $1000.00.

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BUILDING MATERIALS, INC.
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LOWER COST
PACKER-HEAD WINGS
Proved to last as long or longer — yet cost considerably less. Write for prices.
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6—12x2x3' Reg. T&G Jacket.
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2—15x2½x3' Reg. T&G Jacket.
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1—36x4x3' Reg. T&G Jacket.

These forms for sale well below cost.
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Complete Equipment for small block plant including:

Kent Vibra Tamp Machine.
Kent Continuous Mixer water control & regulator.
Kent Elevator.
Steel aggregate hopper holds one day's production.
8" Mold box complete with base and vibrator.
12" Mold box complete with base and vibrator.
20 New steel racks 64 cap never used.
20 Used steel racks 48 cap.
2 Hand lift rack trucks.
1 Pallet dunker.
Attachments for Sash Corner Bull Nose and Half block.
Approximately 1800 steel pallets.
1 Scotch Marine 25 horse boiler with piping and steam regulator.

The above equipment is in excellent condition and complete. Nothing more is needed to produce first class block from any aggregate.

$4,500.00 F.O.B. our yard.

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"ONE PIECE" METAL MOLDS

FOR:
SPLASH-BLOCKS
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Also, Septic Tank Molds (Self-Collapsing type)

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1—Jaeger Mixer — 16S — Electric — Skid mounted overhead with 10' track & skip.
1—3 yd. DUMPCRETE on F7 Ford.
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Excellent condition and priced at $6000.00
CHAMBERSBURG DUNTILE CO.
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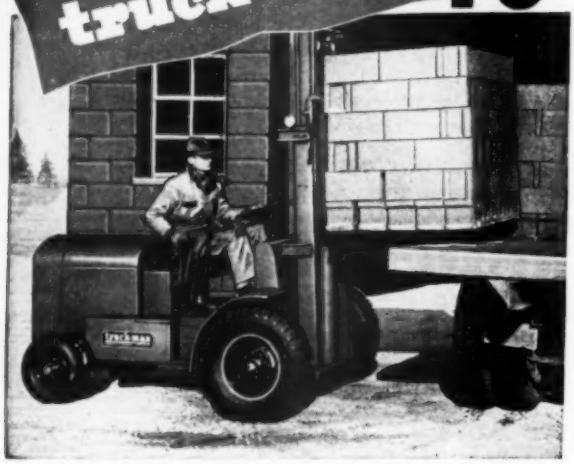
KENT STEADFLOW MIXER

Used very little — greatly reduced

ANNAPOLIS BLOCK CO.
Annapolis, Md.

new truck-man 40



designed . . .

. . . FOR CUBING AND LOADING BLOCKS

THAT'S RIGHT, the new Truck-Man Model 40, two ton, High Lift was designed from forks to engine, especially for handling blocks. It is not just another industrial truck with special forks.

BIG 7.50 x 15, 10 ply Road Lug pneumatics on the drive wheels and 6.00 x 9, 8 ply rib pneumatics give you plenty of traction and footing for yard work. The big Ford engine, for ample power, and the short, 72", turning radius for peak maneuverability, mean that the Truck-Man 40 will really do a job in curing kilns and plant as well.

HERE ARE THREE BIG REASONS WHY THE 40 IS EASY AND ECONOMICAL TO MAINTAIN, TOO:

1 RUGGED — The big Ford Industrial Engine, oversized clutch, heavy duty transmission and axles insure less maintenance.

2 ACCESSIBLE — The tilt cylinder is mounted above floor decking for easy adjustment or service. Clutch, transmission or axles are removed in minutes for bench repairs. No need to pull engine for work as head and oil pan are easily removed.

3 STANDARD FORD PARTS — Serviceable at any Ford garage, include: hydraulic brakes, engine, differential, clutch, drive axle, and wear parts of steering axle.

Write or check coupon and mail for catalog with complete details on the Model 40 and 8 other versatile Truck-Man trucks.

truck-man

Div. of The KNICKERBOCKER CO.
650 Liberty St., Jackson, Michigan

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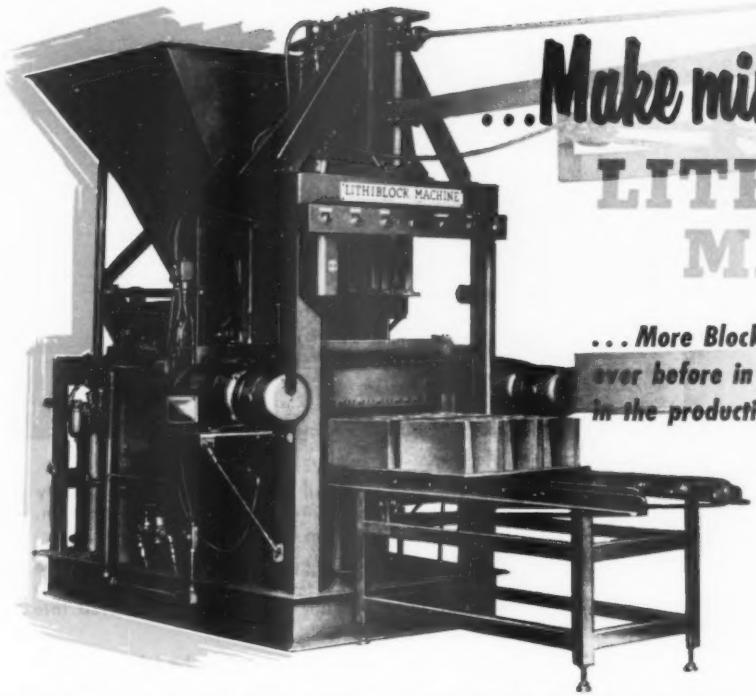


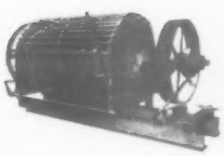
...Make mine a LITH-I-BLOCK MACHINE

...More Block Producers said that in July than ever before in the Company's history of 25 years in the production of concrete products machinery.

LITH-I-SKIP
Self-Supporting
Skip Hoist

LOW INITIAL COST AND HIGH QUALITY OF OUTPUT PLUS FEATURES LIKE THESE MAKE LITH-I-BLOCK YOUR BEST VALUE

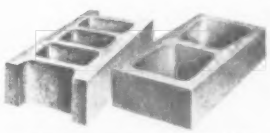
4-POINT HEIGHT CONTROL INSURES TOP AND BOTTOM SURFACES PARALLEL	TAMP OR PRESS OR DO BOTH IN SAME CYCLE TO ASSURE UNIFORM TEXTURE	QUICK-CHANGE MOLD BOX INCLUDING STRIPPERS CHANGED IN LESS THAN TWENTY MINUTES	4-5 CYCLES PER MINUTE WITH SAND & GRAVEL. MORE WITH LIGHT AGGREGATE
STANDARD PLAIN STEEL PALLETS FIT ALL TYPES AND SIZES OF BLOCK	POSITIVE ELECTRONIC TIMING OF FEED DRAWER AND STRIPPING ACTION	FULLY AUTOMATIC, SEMI-AUTOMATIC OR MANUAL OPERATION	AVAILABLE IN TWO SIZES L-5 3-BLOCKS OR L-3 2-BLOCKS PER CYCLE



LITH-I-MIXER
with NiHard
Liners and Blades

Block Producers today must meet ever more exacting requirements—specifications held to closer tolerances, quality controls set to higher standards. Only with equipment of the best engineering design can these demands be efficiently met. A continuing program of research and development enables Lith-I-Bar to supply you with the machinery and know-how to keep you ahead of the field.

SALES AND SERVICE THE WORLD OVER

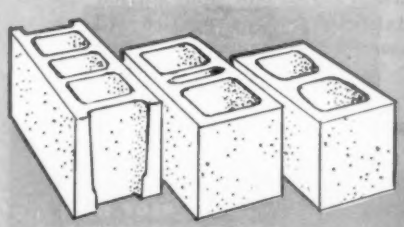


Make the popular 4" high block as well as all standard sizes on the Lith-I-Block Machine.

SAVES YOU MONEY TO BEGIN WITH—EARNS YOU MOST IN THE LONG RUN

LITH-I-BLOCK MACHINE

A Product of
THE LITH-I-BAR COMPANY
HOLLAND, MICHIGAN



WRITE TODAY FOR COMPLETE DETAILS ON LITH-I-BLOCK MACHINE

LITH-I-BAR CO. HOLLAND, MICH.

Please send full information on LITH-I-BLOCK MACHINE

Firm Name_____

Individual_____ Position_____

Address_____ Phone_____

City & State_____

ON THE JOB!

THE NEW TRAVEL BATCHER

The TRAVEL BUTCHER can travel behind a truck with complete safety without Hi-way violation. On arriving at a destination, average set-up time is ten minutes.

Batch mixture is maintained uniformly with accurate scales mounted on the machine. The capacity of the TRAVEL BATCHER is 60 yards an hour delivered into mixer trucks.

By bringing the batch plant closer to the job, it reduces the number of truck mixers needed by as much as 83%.

Maintenance bills, long a headache of every ready-mix concrete operator, are reduced to a minimum.

The TRAVEL BATCHER offers the performance of a stationary batch plant, plus the convenience of mobility.

NORTH . . . EAST
SOUTH . . . WEST

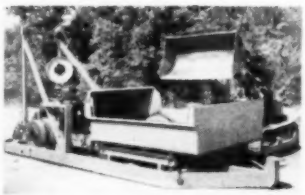
Satisfied customers everywhere make similar statements.

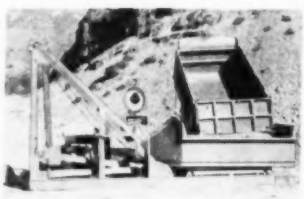
THEODORE LORANGER & SONS
in New Bedford, Mass. say,

"My new Travel Batcher is ruggedly constructed to give the best results. Instant maneuverability makes this machine invaluable for multiple pours in one day."

ALBERT LORANGER

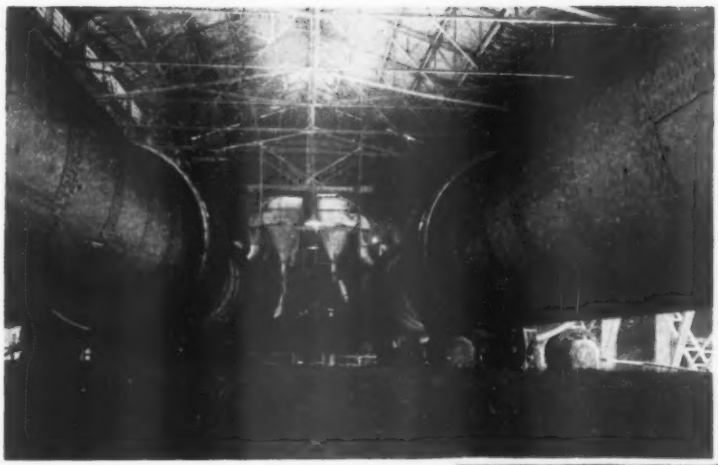
The hopper, with a capacity of 8 yards can be recharged with either a dump truck or a front-end loader.



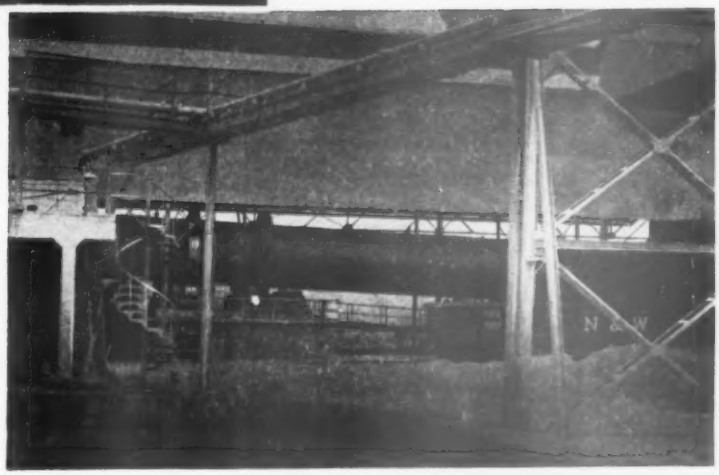


TRAVEL BATCHER

For additional information write, wire or phone:
SOUTHEAST READY-MIX - 6450 HOLLADAY BOULEVARD - SALT LAKE CITY, UTAH



two GOOD kilns mean ANOTHER



Yes, two good rotary kilns mean another, when the first two—bought 26 years ago—are still going strong.

That is just what happened to a VULCAN customer. Over 26 years ago this concern bought two 10′x215′ VULCAN rotary kilns for the manufacture of Portland cement by the wet process.

When plans were made for the installation of an additional kiln, VULCAN was awarded the job because of the fine performance of previous installations at this plant.

The new kiln measures 10′x300′. Improved features on this newest of all kilns include heavily reinforced all-welded steel shell, mounted on the latest type VULCAN supporting roller and thrust bearings; all of which are automatically lubricated and easily adjusted to compensate for wear and moderate misalignment. VULCAN designed and built equipment means good, dependable equipment. When you build or rebuild, contact VULCAN of WILKES-BARRE. VULCAN's facilities are of the latest and their Engineering Staff is highly competent and fully staffed to design additions or complete installations. Write today for Bulletin A-442 on Rotary Kilns, Coolers, Dryers, Retorts and other dependable Processing Equipment.

Any information on items listed below will be sent to you immediately:

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- Improved Vertical Lime Kilns
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- Briquetting Equipment
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- Heavy Duty Electric Hoists
- Self-Contained Electric Hoists
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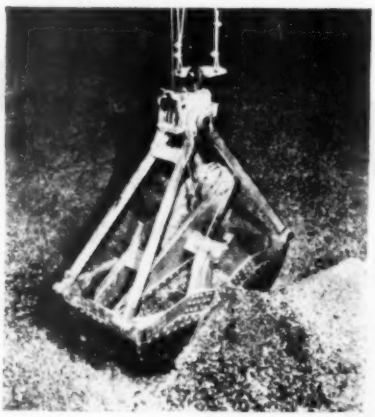
This expert engineering service is available to you without obligation for the purpose of analyzing your operating problems and helping you select the proper size, weight and type bucket to meet your stepped-up requirements.

In all probability, we have already had experience in solving problems that may be puzzling you. Write for this free service.

Write for Bulletin 2378 for complete information, construction details and specifications.



Size 720-S rated 1¾ yd. BLAW-KNOX Bucket Handling Limestone and Clay.

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PITTSBURGH 38, PA.
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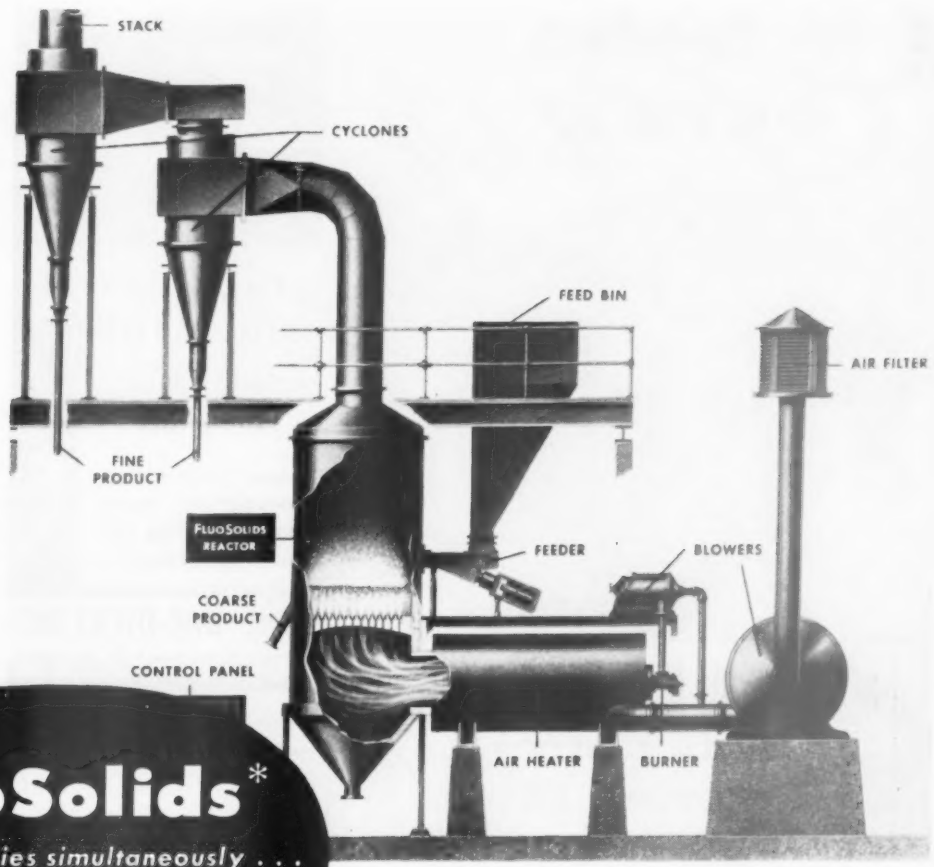
BLAW-KNOX CLAMSHELL BUCKETS
FOR THE CEMENT INDUSTRY

Having trouble sizing wet, sticky material?



Typical Dorrco FluoSolids System utilizing single compartment Reactor for simultaneous drying and sizing operations.

FluoSolids*

sizes and dries simultaneously . . . makes a sharp separation in the 28 to 150 mesh range.

If you want to size wet, sticky material in the 28 to 150 mesh range — take a good look at FluoSolids. It's a radical departure from the conventional sizing and drying layout.

What can it do for you? Well, first of all, it will handle your sizing and drying jobs simultaneously. This means a single, compact installation — elimination of materials transfer between drying and sizing equipment — and resulting first-cost economy.

Operating advantages? FluoSolids gives you plenty. You can make a far sharper separation (roughly 95% complete) at both the fine and coarse ends than with conventional units. Complete yet simple, automatic instrumentation gives you precise temperature control — cuts manpower needs — saves heat — and enables the System to take feed variations in stride. There are no moving parts in the Reactor itself, either — an important factor in low maintenance costs.

If these facts sound interesting, and your needs are from one ton per hour up, we'd like to send you more detailed information. No obligation, of course.

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*Reg. U. S. Pat. Off.

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Provides Steady Flow of Dry, Finely Ground Materials which tend to bridge in storage. Uses only small amount low-pressure air.

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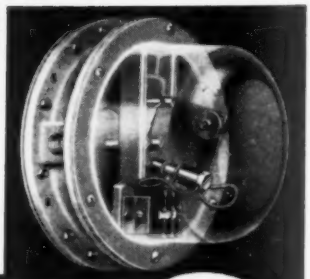
For All Bulk Materials

signals change in level; automatically starts and stops filling and emptying equipment.



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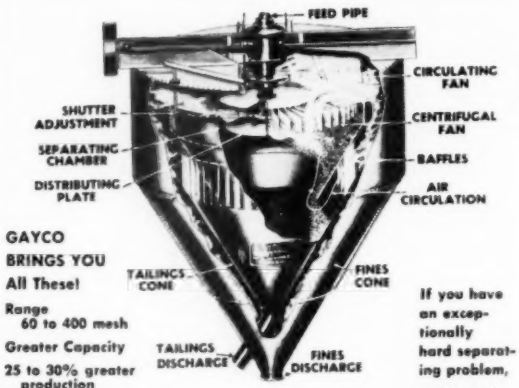

GAYCO BRINGS YOU All These!

- Range 60 to 400 mesh
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- Quick and easy adjustments

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If you have an exceptionally hard separating problem,

TRY THE GAYCO.

Closer separations are possible with the Exclusive Gayco Centrifugal sizing fan. Higher production results from a more complete removal of the fines made by the mill. The efficient Gayco sizing eliminates all undesirable oversize from the product.

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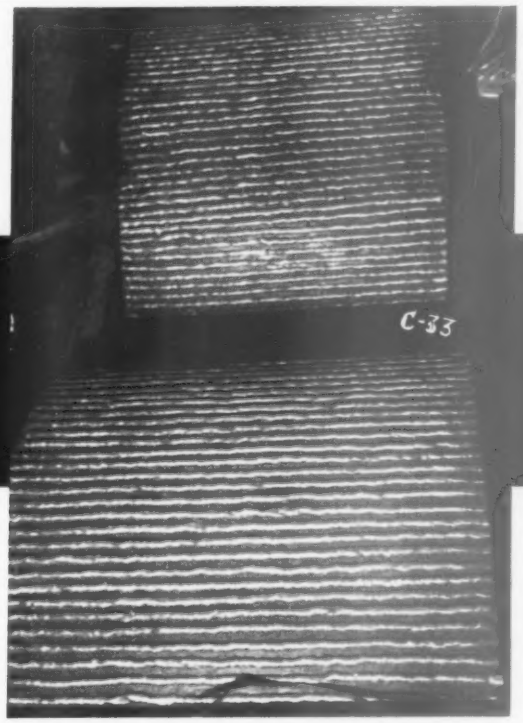
"Resisto-Loy" hard-facing beads spaced ¾ inch apart on new smooth manganese crusher rolls not only increase production, but if properly maintained with "Resisto-Loy" eliminate the necessity of rebuilding the rolls.

hard-surface your New Crusher Rolls with "RESISTO-LOY"



Note in photo that by placing beads ¾ inch apart new beads can be placed between the older beads each time. Thus rolls retain their shape at all times. This is a job your own welder can efficiently handle. For information on maintaining and rebuilding all types of crusher machinery, call in our field man. He is a specialist.

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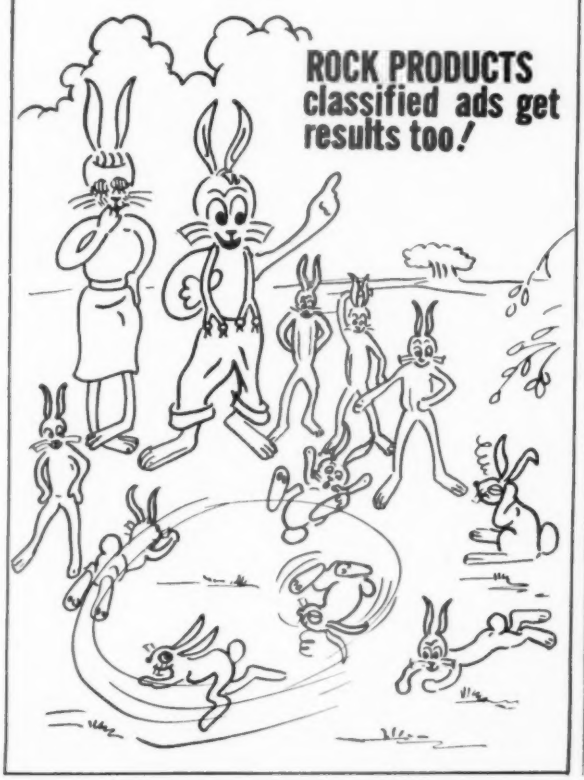

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Available in a wide range of sizes in complete systems or single units, these pumps reduce the cost of maintenance because the parts that take the punishment are made of special Ni-Hard alloy iron in McNally Pittsburg's own foundry.

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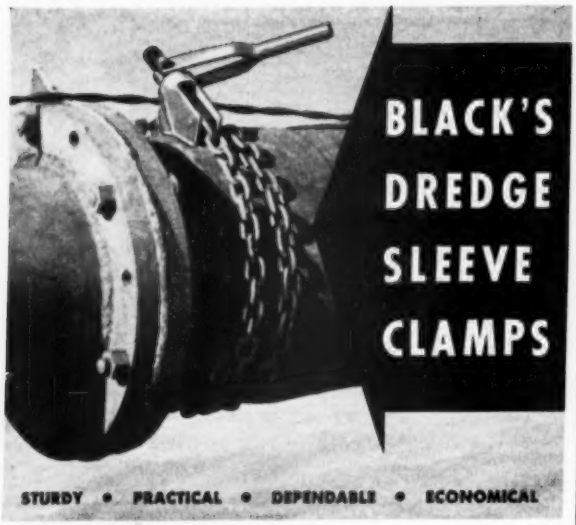

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STURDY • PRACTICAL • DEPENDABLE • ECONOMICAL

Furnishes a positive seal for round flexible joints. Used by leading dredging and hydraulic sand-and-gravel operators, and the U. S. Engineering Corps. This Multi-use chain sleeve clamp is easy to apply . . . positive in action. Write for illustrated folder, today.

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DREDGING PUMPS

performance-proven on the toughest jobs

H&B ESTABLISHED 1887

Hetherington & Berner sand and gravel pumps are available in two general types: *STANDARD,* (4″, 6″ and 8″ sizes) with semi-steel parts, for ordinary working conditions and moderate heads; and *DREADNAUGHT,* (6″, 8″, 10″, 12″ and 15″ sizes) with manganese steel parts, for heavy duty jobs with stringent head conditions.

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RP-10

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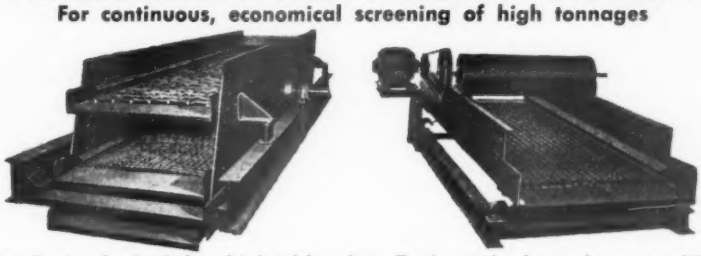
For continuous, economical screening of high tonnages



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Heavy Duty prices from .....$1095.00 **General Purpose** prices from $395.00

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Mfrs. of Scales, Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers and Feeders

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Pangborn Dust Collector, type C.K., practically new, 2 sections with valves and automatic controls.

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1¾ yd. Manitowoc 3000A diesel crane.
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Nos. 12, 10, 9, 8, 7½ and 6 Allis-Chalmers gyratory crushers.
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2 Northwest Model 6 Crane/Draglines

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1 Set Mang. Steel Screen Plates 6½"x7";
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1—16"x56'—3 H.P. M. Gear Motor....$800.
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5 H.P. Westinghouse, Type K-T 4-5A, 1800 RPM, Ser. #634498 S.B.
5 H.P. Westinghouse, plate missing, 1180 RPM, S.B.
7½ H.P. Gen. Elec., Type F.T.958, 870 RPM, Md. #74-A-164 S.B.
7½ H.P. Watson, Type K.H., 1720 RPM, Ser. #54900 S.B.
7½ H.P. Westinghouse, 870 RPM, Ser. #438-4524, Fr. 370-C-S.B.
7½ H.P. Westinghouse, 1160 RPM, Ser. #423-9921, Fr. 352C S.B.
7½ H.P. Westinghouse, 1160 RPM, Ser. #423-8793, Fr. 352 C.
10 H.P. Wagner, Type B.P., 1140 RPM, Ser. #78830 S.B.
20 H.P. Howell, Type SCE, 1200 RPM, Ser. # 76549, Fr. 316-E B.B. Intermittent Use.

Slip Ring Motors—3 ph. 60 cy. 440 v.
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18"x36" Jaw, Traylor, Bulldog.
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Pioneer 40x22 roll crusher Diesel powered.
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Cedar Rapids Portable Super Tandem, excellent.
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Cedar Rapids 40x33 Port. Secondary, Diesel.
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CRUSHERS

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Cedar Rapids 10x20, 20x36, 25x40. Farrell 10x20, 13x30, 14x36, 18x36, 36x48. Buchanan 36x42.
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Allis-Chalmers 30x18. Good Roads 10x30. Telsmith 18x32. Champion 1030, 1040, 1236, 1530.

GYRATORY: Allis-Chalmers-McCully, 6", 7½", 8", 9", 12K, 20", 30", 42", 14", Newhouse, 24", 36" Gyraphers, 18", 28". Intercone Telsmith. Telsmith 5H, 10-H, 13-B, 16-B. Kennedy Van Saun 7, 19, 25½-S, 37. Traylor Ty 1'8", Ty 2'4", T-4½".

ROLL: Cedar Rapids 40x20. Diamond 40x22. Pioneer 30x18. Telsmith 24x16. Pioneer 30"x18". New Holland 24x16.

HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania 8X2, 22x22. Cedar Rapids 20x33. Jeffrey 36x42, Jeffrey 36x24, 36x40.

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Several Used Late Model 6 Northwest 1½ yd. Cranes. Used Model 6 Shovel Attachment.
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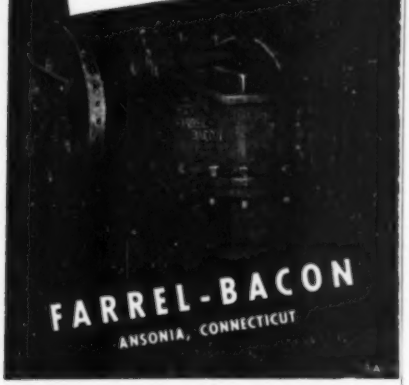

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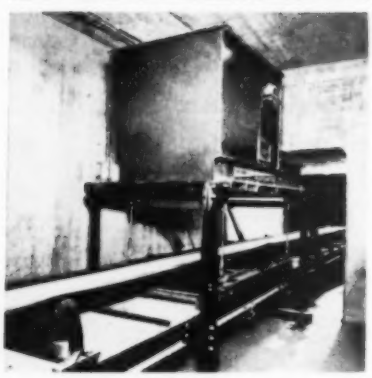

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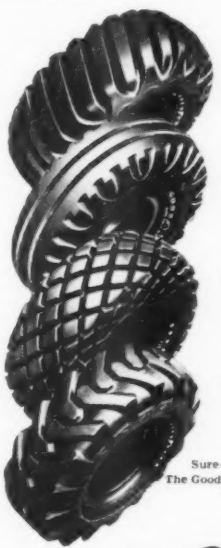

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